Nebraska GIS Steering Committee

Building a Spatial Data Infrastructure for Nebraska – December 2004

Coordinating the Development and Sharing of GIS Technology and Geospatial Data Among State, Local and Federal Agencies and the Private Sector in Nebraska

— An Annual Report and Nebraska Strategic Plan

NEBRASKA GEOGRAPHIC INFORMATION SYSTEMS
STEERING COMMITTEE

BUILDING A SPATIAL DATA INFRASTRUCTURE FOR NEBRASKA

An Annual Report and Nebraska Strategic Plan

December 2004

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Building a Spatial Data Infrastructure for Nebraska – December 2004

— An Executive Summary —

An Annual Report and Strategic Plan. The Nebraska GIS Steering Committee is required by state statutes to submit an Annual Report on its activities to the Governor, the Legislature, and the Nebraska Information Technology Commission. For the last three years, the Steering Committee has woven into this Annual Report process the development and/or updating of a GIS strategic plan for Nebraska.

Strategic Direction. The strategic focus of the GIS Steering Committee's efforts over the last year, and its future direction, reflects its mission statement and the seven long-range goals first outlined in its 2001 Strategic Plan.

> *The mission of the Nebraska Geographic Information System Steering Committee is to encourage the appropriate utilization of GIS technology and to assist organizations to make public investments in GIS technology and geospatial data in an effective, efficient, and coordinated manner.*

This Annual Report and Strategic Plan provides an update on the status of each of the seven long-range goals and the related activities and provide a blueprint for future collaborative efforts directed towards realizing those goals. Some of those activities are highlighted below.

Priority Geospatial Data Development. A major focus of the GIS Steering Committee's activities is the promotion and coordination of interagency efforts to develop geospatial databases that are needed by a wide variety of GIS users. Many of these efforts are multi-year and interagency in their scope. This past year, several multi-year projects data development efforts were completed. Among these was a three-year, collaborative effort between the Department of Natural Resources and the US Geological Survey to develop updated statewide, geo-referenced, aerial photography. Also completed this year was a five-year intergovernmental effort to develop statewide digital soil survey maps.

It is also important to note the progress and continued interagency cooperation and support for other major multi-year database development efforts, which are not yet ready for completion celebrations. The Department of Roads is nearing completion of a multi-year effort to develop a statewide, comprehensive transportation geospatial database that includes all state and local roads. Interagency participation and support also continues for two water-related database development efforts. One is a re-mapping of all of Nebraska surface features and capturing them in a intelligent, standardized database structure (National Hydrography Dataset) that will ultimately provide the basis for integrating a wide range of surface water data collected by numerous agencies. This is an interagency effort that is led by the Department of Natural Resources and involves three state-level agencies and one federal agency. The other water-related data development effort is a re-mapping of the Nebraska's watershed boundaries; and this effort is led by the US Natural Resources Conservation Services and involves input from multiple agencies.

Challenging Dynamic Local Data. Over the last year, new data development initiatives have shifted to focus on two widely-needed geospatial databases that have proven to be particularly difficult challenges: property ownership parcels and street centerline-address range databases. In part, these two databases are challenges because they involve dynamic data that is basically maintained at the local government level. Previous successful database development efforts

have focused on datasets that were not particularly dynamic and that were amenable to an approach where one state or federal agency took the lead to develop the data, with others helping to provide support. This model does not adapt easily to the property parcel and street address data maintained by 93 counties and numerous cities. Still, these two datasets are needed by a wide variety of agencies for a wide variety of applications. The GIS Steering Committee is taking the lead in interagency efforts to explore new models for how these multiple entities might partner to both develop, but, also equally important, maintain this dynamic data.

Evolving Models for Data Partnerships. At its best, most GIS data development or acquisition is accomplished through interagency cooperation and partnerships because so many of the same datasets are needed by multiple users. Last year there were some significant developments in the evolution of new data partnership models. In the greater Omaha metro area, a multi-partner, multi-state consortium came together under the leadership of the City of Omaha and the Metropolitan Area Planning Agency to acquire updated aerial imagery and elevation data. The GIS Steering Committee provided the leadership to form a multi-agency (state, federal, and public power) effort to acquire, process and serve copies of new statewide color imagery developed by the US Farm Services Agency. Efforts are currently underway to explore the possibility of a cooperative project involving the Nebraska Health and Human Services System, the US Geological Survey and several Nebraska municipalities and counties to acquire high-resolution imagery this coming spring. All of these projects share the difficulties of overcoming the hurdles involved in pooling funds from multiple entities at different levels of government and with different budget cycles.

Non-Data Spatial Infrastructure Initiatives. As widely needed geospatial data is developed, it is equally important to develop system for finding and sharing that data. Significant progress was made on this front last year. A memorandum of understanding was developed between the GIS Steering Committee and the Nebraska Department of Natural Resources to guide the development and operation of an enterprise-wide Nebraska Geospatial Data Center to be hosted by NDNR. Related to this are efforts that have been taken to develop an enterprise geospatial data clearinghouse, which will enable online searches for available Nebraska-related geospatial data. Related to this effort was the development of an online metadata entry form that will facilitate agencies to document and list their geospatial data holdings in the clearinghouse catalog. Also supporting the evolution of the Geospatial Data Center at NDNR was the signing of an MOU with USGS to provide Nebraska data to the online Internet-based National Map.

Achieving land record modernization at the local government level is a priority long-term strategic goal of the GIS Steering Committee. One the biggest hurdles that this initiative must overcome is the lack of a policy consensus around structures for how state, local, regional and federal entities might cooperate to sustain such an effort. This past year, the Steering Committee has worked with a range of interested parties, including the Nebraska Association of County Officials and the Governor's Policy Research Office in an attempt to develop consensus on how these groups might move forward together to achieve some of the recommendations that were developed out of the Nebraska Land Record Modernization Study that the GIS Steering Committee sponsored and which was completed in 2003.

Building a Spatial Data Infrastructure for Nebraska — December 2004

An Annual Report and Strategic Plan

Nebraska GIS Steering Committee

Table of Contents

Building a Spatial Data Infrastructure for Nebraska — December 2004

Nebraska Geographic Information Systems Steering Committee

INTRODUCTION

The Nebraska Geographic Information System Steering Committee was established by the Legislature in 1991 *(Reissued Revised Statutes of Nebraska, 1943, §81-2601 through §81-2605),* in an effort to coordinate the implementation of GIS technology by public entities in Nebraska. Geographic Information Systems (GIS) is a powerful information technology that has numerous applications in both the public and private sectors. The Steering Committee's role is to see that public investment in GIS technology is achieved in a coordinated, efficient manner.

The GIS Steering Committee is an intergovernmental coordinating body with representatives from state, local, regional and federal public entities. A Coordinator provided through the Division of Communications of the Nebraska Department of Administrative Services supports the Steering Committee's work.

As required by statute, the GIS Steering Committee produces an Annual Report that is submitted to the Governor, the Clerk of the Legislature, the Nebraska Intergovernmental Data Communications Advisory Council, and Nebraska's Chief Information Officer.

REPORT BACKGROUND

Geographic information is a significant subset of the information explosion that has occurred over the last two decades. In the broadest sense, geographic information is information that includes a spatial reference (street address, latitude/longitude, section/township) as part of the data and is generically referred to as *geospatial or spatial data*.

The geographic component of information has become increasingly important, as information technologies, such as Geographic Information Systems (GIS), have been developed to analyze and display information based on its location. Location or place is an important aspect of most data collected and used by public agencies. GIS was initially developed primarily for use in the area of natural resources management. However, as the software's capabilities and the understanding of the technology have grown, the use of GIS has now expanded to include a wide and rapidly growing range of applications (assessment, economic development, transportation planning, public safety, emergency response, etc.). Because of the powerful capabilities of GIS and other geospatial technologies, many public agencies (state, local and federal) are making investments in the technology and more will do so in the future.

What is Spatial Data Infrastructure? Many GIS experts suggest that 80 to 90% of GIS implementation costs are commonly related to geospatial data development or acquisition. Fortunately, one of the more powerful features of GIS is its capability to facilitate the sharing and integration of data from a wide variety of data themes and sources. Past experience has taught public agencies the importance of coordination in making investments in information technology infrastructure. Public agencies have learned that through coordination they can aggregate demand and avoid the costly development of duplicate, non-compatible, computer and communication networks. As our understanding of GIS technology costs and requirements has matured, there is also a growing appreciation of the importance of coordination in the development of a common *spatial data infrastructure*, as a way to avoid the costly development of duplicate, non-compatible spatial data.

To take maximum advantage of the GIS capability to share and integrate data, and to secure the maximum return from public investments in geospatial data, it is important that public investments in geospatial data are coordinated across all levels and types of public agencies. State coordinating bodies, like the Nebraska GIS Steering Committee, are evolving to play a pivotal role in a loosely coordinated state, federal and local effort to build a common *National Spatial Data Infrastructure (NSDI).* The purpose of this plan is to identify those key components and initiatives that are critical to the pursuit of a coordinated GIS development strategy and the development a common *Spatial Data Infrastructure for Nebraska.*

The Homeland Security initiatives, launched in the wake of the September 11th terrorist attacks, have served to highlight the importance of coordinated NSDI development. The events in New York graphically illustrated the importance of having accurate, current geospatial data readily accessible in times of an emergency. In response to the September 11th events, the GIS Steering Committee worked with the Nebraska Emergency Management Agency (NEMA) to identify what geospatial data was currently available to meet its short-term needs and is currently working with NEMA to meet its long-term GIS-related needs.

STRATEGIC DIRECTION

In the year 2000 the Nebraska GIS Steering Committee published a Strategic Plan and Annual Report that outlined its mission and six long-range goals or strategic initiatives that would serve as guides in *Building a Spatial Data Infrastructure for Nebraska*. In aftermath of the September 11th terrorist attacks, the Steering Committee added a new strategic initiative related to assisting in the application of GIS technology to Homeland Security initiatives when it updated its Strategic Plan in 2001. On an annual basis since then, the GIS Steering Committee has reviewed and affirmed those seven strategic initiatives, and this report provides an update on the status and plans related to those initiatives.

NEBRASKA GIS STEERING COMMITTEE MISSION

The Nebraska GIS Steering Committee has defined a mission statement to serve as a guide for its work.

> *The mission of the Nebraska Geographic Information System Steering Committee is to encourage the appropriate utilization of GIS technology and to assist organizations to make public investments in GIS technology and geospatial data in an effective, efficient, and coordinated manner.*

LONG-RANGE GOALS AND/OR STRATEGIC INITIATIVES

Within the context of the Steering Committee's mission statement and its strategic planning process, the GIS Steering Committee has reaffirmed the following long-term goals for coordinated GIS development.

Priority Database Development*. Coordinate the development of widely needed digital geospatial databases in a standard reference format and establish systems for the on-going cooperative maintenance and enhancement of these priority geospatial databases.*

Core subsets of geospatial databases (roads, streams, governmental boundaries, aerial photography, etc.) are needed by a wide range of state, local and federal government agencies and private entities. The cooperative development and maintenance of these core databases is the most cost-effective means of providing these databases. These core databases also provide the framework for the development of numerous other geospatial databases. The cooperative development of standardized framework databases will minimize costly duplication of effort, facilitate data sharing and minimize costly data integration problems due to incompatible data.

Homeland Security and Emergency Management*. Continue to assist, as requested, the Nebraska Emergency Management Agency and other emergency and public safety agencies in planning for short and long-term GIS and geospatial data requirements to support Homeland Security and other public safety initiatives.*

Timely, accurate information, easily accessed and capable of being shared across federal, state, and local political jurisdictions is fundamental to strengthening the decision-making capability of those tasked with the homeland security and emergency management mission. It is estimated that geographic location is a key component of approximately 80-90% of all government data. Geospatial information technology utilizes the locational component of data to provide the

capability to quickly visualize activity patterns, map locations, and understand the multi-layered geospatial context of emergency situations.

The GIS Steering Committee has long seen the tremendous potential of GIS technology for emergency preparedness and response applications. In the aftermath of the September 11th attacks, it has become clearer that in emergency situations of whatever origin, our nation and/or state is dependent on rapid access to and application of many types of current, accurate geospatial information. Given the nature of the geospatial data needed for these applications, it is also clear that interagency collaboration and coordination are keys to realizing that potential.

Land Records Modernization. *Promote and facilitate local government land record modernization and GIS development.*

One of the most promising and cost-effective application areas of GIS technology is the modernization of how local government land records are maintained and accessed. In addition to land record modernization, there are numerous other potential local government applications of GIS technology (emergency response, public health and safety, zoning, taxation, street and utility maintenance, etc.) The land record information maintained by local governments is also one of the framework geospatial databases that are needed by a wide variety of state, local and federal agencies and private entities. It is in the interest of the broader GIS community that this land record information be developed in a standardized geospatial format that is accessible to multiple users at the local, state and federal level. Because of the limited resources at the local government level, partnerships will be necessary in many areas to facilitate the development and maintenance of this data.

Data Sharing and Distribution. *Develop structures, standards, and processes that facilitate easy access to, integration, and usability of publicly available geospatial data.*

A key component of any coordinated GIS development strategy must be the development and maintenance of mechanisms to facilitate the sharing of commonly needed geospatial data. There are several essential elements to such a data sharing strategy. These include the easy ability to discover the existence of data and how it can be accessed. The documentation of the data to facilitate its proper use is another essential element, as is the establishment and wide implementation of data standards to facilitate data integration. Geospatial data users and types of data are diverse and data sharing strategies must address this diversity of users and needed data (natural resources, demographics, land records, transportation, utilities, city/regional/ state/federal, etc.).

Technical Assistance*. Provide technical assistance to local governments and state agencies.*

With the growing interest in GIS technology, it is no longer just being used by a limited number of fairly large public agencies. It is becoming a powerful mainstream information technology, with a wide variety of state and local level agencies either developing or having an interest in developing GIS applications. With this growing interest in the technology, there is a parallel growing need for technical assistance to help these agencies develop their GIS/geospatial data or applications. These technical assistance needs range from guidance in designing and planning the development of an in-house capability; to specialized GIS application development; to large-scale geospatial data development projects; to on-going development and maintenance of specific GIS applications. Up to this point, the primary operational model in Nebraska has been for each agency or local government to develop and maintain its own in-house GIS capability.

With more and more agencies expressing interest in the technology, it is time to consider the merits and efficiencies that might be gained by arrangements to aggregate the demand and resources available to support these technical services.

Education/Outreach. *Promote an educational outreach program designed to maximize the overall return on public investments in the development of geographically referenced databases and GIS systems by providing educational materials, presentations and coordination services to the public officials and technical staff who will be making these investment decisions.*

While GIS can no longer be considered a new technology, it is still new and relatively complex for many of the agencies and policy makers who are now considering their initial public investments in the technology. Without education and/or technical assistance these public sector decision-makers can easily make costly mistakes in their initial GIS investment decisions. The risks of costly mistakes have less to do with the hardware and software, and more with data purchase or development decisions. Public investments in a GIS educational/outreach program, directed toward government decision-makers, will increase the probability of wise public investment decisions in GIS technology. Such an education program will increase the likelihood that costly geospatial databases developed for one area and application will not only work as intended for that application, but also for other areas and applications. Such an education/outreach program is a vital component of a coordinated GIS development effort.

Strengthen Coordination Capacity. *Strengthen the GIS Steering Committee's capacity to facilitate the implementation of priority geospatial database development decisions, data sharing, interagency/intergovernmental partnerships, and agencies' utilization of GIS technology.*

While Nebraska statutes define broad areas of responsibilities for the Nebraska GIS Steering Committee, the Committee has very little in the way of independent authority and/or resources to seriously address those responsibilities. With limited authority and no operational capability or budget, Steering Committee decisions and priorities can only be implemented through the sponsorship and active support of independent state, local or federal agencies. The coordination of GIS development for the overall good of the broad and growing Nebraska GIS user community is a unique and challenging mission not specifically shared by any other public entity. In some specific instances other agencies' missions and priorities are congruent with those of the Steering Committee, and in those cases those agencies may take the lead on a project on behalf of the Steering Committee. However, where this parallel sense of priorities does not exist, the Steering Committee is seriously limited in its ability to implement its priorities. Many of today's major geospatial data development efforts are only feasible through intergovernmental partnerships. The Steering Committee's structure is poorly suited to facilitating the actual implementation of those partnership projects. The availability of seed funding specifically dedicated to collaborative GIS development efforts and the ready access to institutional channels whereby the resources from intergovernmental partners could be efficiently combined and leveraged would enhance the Steering Committee's ability to implement collaborative GIS development projects.

DATA DEVELOPMENT GOALS AND INITIATIVES

One of the primary foci of National Spatial Data Infrastructure (NSDI) development is the development and maintenance of a core set of geospatial databases that are used in a wide variety of GIS/geospatial data applications. This report provides, for each prioritized database, an explanation for why it is a priority, an assessment of its current status, and an overview of anticipated future directions and issues.

PRIORITY DATABASE DEVELOPMENT AND MAINTENANCE. *Coordinate the development of widely needed digital geospatial databases in a standard reference format and establish systems for the on-going cooperative maintenance and enhancement of these priority geospatial databases.*

A wide range of state, local and federal government agencies and private entities need a core subset of geospatial databases. The cooperative development and maintenance of these core databases is the most cost-effective means of providing these databases. These core databases also provide the framework for the development of numerous other geospatial databases. The cooperative development of standardized framework databases will minimized costly duplication of effort, facilitate data sharing and minimize costly data integration problems due to incompatible data.

A set of seven data layers or themes have been identified nationally as priorities for coordinated nationwide development:

Hydrography	Ortho-aerial imagery	Surface Elevation
Cadastral	Transportation	Administrative Boundaries
Geodetic Control		

Collectively, these data themes are referred to as the "Framework" data layers because of the role they play in providing an underlying data framework for a very broad array of GIS applications. Because of the importance of these data layers, the Nebraska GIS Steering Committee has also prioritized their statewide development and maintenance. In addition to these framework data themes, the Nebraska GIS Steering Committee has also prioritized for statewide development five other data themes due to their specific importance to Nebraska:

Groundwater Wells	Soil Surveys	Street Addresses
Watershed Boundaries		

FRAMEWORK LAYERS

Theme: Hydrography

Why it is a Priority. Geospatial databases that accurately map and provide core descriptive attribute information on surface water features have been prioritized for development by both the Nebraska GIS Steering Committee and the Federal Geographic Data Committee because they are among a select subset of framework databases that provide basic data infrastructure for a wide cross-section of GIS applications and geospatial data users. This dataset is also a core geospatial dataset for the USGS National Map effort and the guidelines for critical Homeland Security geospatial data needs. The Nebraska 2000 Annual Report and Strategic Plan provided extensive background information and rationale about the needs for and importance of this geospatial database.

Because of the importance of surface water to Nebraska, numerous state, local and federal agencies collect, analyze, and use data related to surface water features (rivers, streams, canals, lakes, wetlands, etc.). There is currently no statewide, digital, surface water features geospatial database available that is sufficiently comprehensive, and at a scale of spatial accuracy and detail to serve as a standard reference database for these wide-ranging applications.

Current Status. Until the current project to develop an updated digital map of Nebraska's surface water features got underway in 2001, the primary statewide geospatial hydrographic database that existed for Nebraska was a 1:24,000 scale database created in the early 1990s by the Nebraska Department of Natural Resources (NDNR). This database was digitized from dated 7-1/2 minute USGS paper quad maps and only the centerline for the primary stream for each watershed basin was collected at that time. Only limited attribute data was collected and available. Another available statewide database is a 1:100,000 scale National Hydrographic Dataset (NHD) developed for Nebraska and the rest of the country as part of a joint effort by USGS and EPA. The NHD database model includes several special features to enhance its ability to serve as a surface water feature database for a wide variety of applications. The NHD developed by USGS/EPA is based on non-updated, hydrographic line work from USGS 1:100,000 scale maps.

In 1999, the Nebraska GIS Steering Committee adopted as a priority the development of an updated, 1:24,000-scale hydrographic dataset based upon the standards for high-resolution NHD. This decision was based upon the recommendations of an intergovernmental Water Resources Database Advisory Committee formed in late 1998 to study and make recommendations on water-related geospatial databases. Since that time, 1:24,000 NHD datasets have been completed, for 15 watershed areas (8-digit HUCs - Hydrologic Unit Catalog), 8 more are completed and awaiting certification by USGS and 5 more are in process. These 28 catalog units include most of the watershed areas located in and around the lower Platte River basin, the Big and Little Blue River basins in south and southeastern Nebraska, and the Republican River Basin in southern Nebraska. There are approximately 70 HUC (8-digit) watershed areas in, or partially in Nebraska. The current focus of this interagency effort is NHD development is South Platte Basin, in the Nebraska panhandle.

This project has been an interagency effort from the beginning. The Nebraska Department of Natural Resources (NDNR) is the lead state agency, with a work share agreement with the US Geological Survey. Under this work share agreement, NDNR is responsible for in-house creation of the updated stream vectors and USGS is responsible for conflating the attributes, quality control, and providing training and technical assistance. Also assisting in this project is the Conservation and Survey Division - UNL. Start up funding was contributed by the Nebraska Information Technology Commission, the Nebraska Dept. of Roads, local Natural Resources Districts and the Nebraska Dept. of Environmental Quality. After the initial startup funding, the project has been primarily funded by NDNR in-kind staff contributions and by grants from NDEQ's Section 106 Fund and NDEQ's 319 Non-point source funds.

The chart below provides a rough overview of the currently planned sequence and estimated timeline for Nebraska NHD development by river basin area. The current plan is to complete work in the South Platte basin and then proceed roughly in a clockwise direction around Nebraska with statewide completion in 2008. If special agency projects or needs warrant, river basin sequencing can be reconsidered. Because there are so many variables, this can only be a very rough estimate. One key variable is proving to be the work that is being done by other non-Nebraska agencies. The US Forest Service has contracted with the USGS to

develop high-resolution NHD for the Niobrara Basin all along northern Nebraska. However, this work is not being done to the same specifications as the NDNR NHD work. The Niobrara NHD is not being remapped based on recent aerial imagery, but is instead based the line work from the 7.5 minute USGS topographical quad maps. Because of this, it is likely that at some time in the future this Niobrara work will need to be revised to be consistent with the rest of the Nebraska NHD.

Basin	**Start Date**	**End Date**
Missouri Tribs		Done
Blue		Done
Republican		Done
South Platte	November 2005	March 2005
North Platte	March 2005	September 2005
Niobrara	September 2005	May 2006
Elkhorn	May 2006	September 2006
Nemaha	September 2006	December 2006
Lower Platte	December 2006	April 2007
Loup	April 2007	March 2008
White-Hat	March 2008	April 2008
Lewis and Clarke	April 2008	May 2008
Hat	May 2008	June 2008

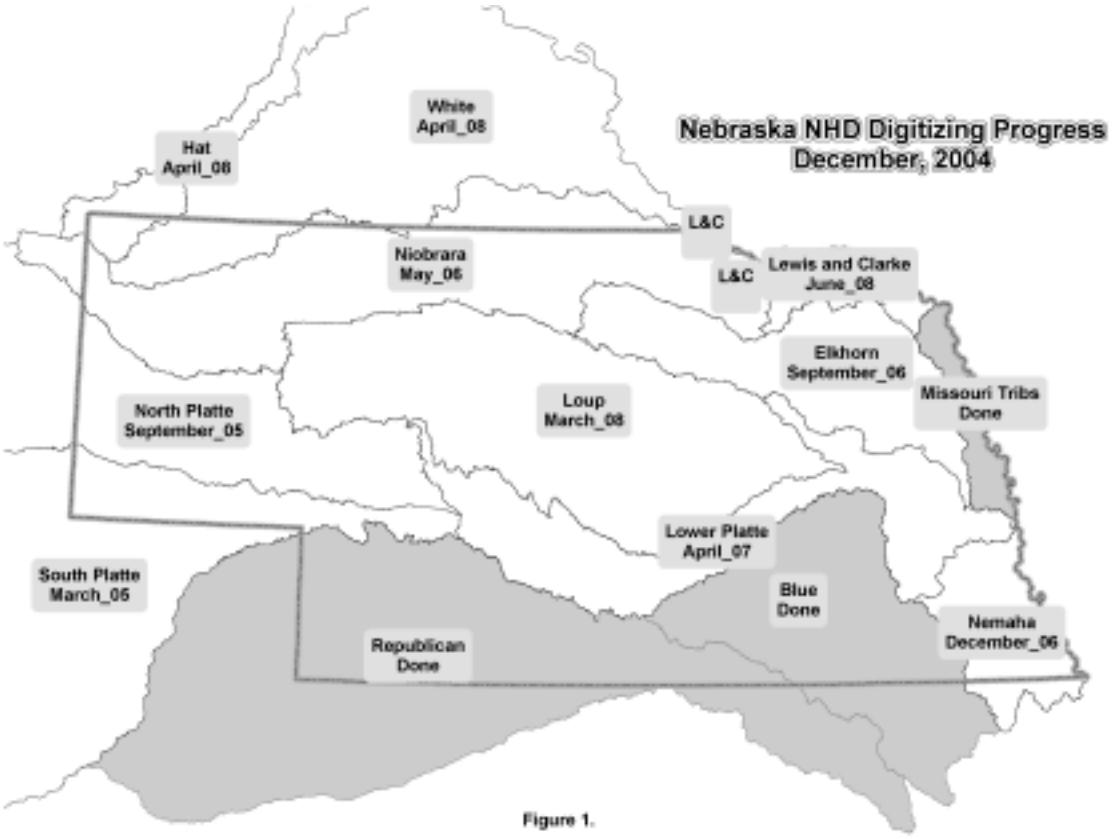

Figure 1.

Source: Hydrographic line work is digitized from 1993 and/or 1999 1:12,000-scale DOQs. Attributes are conflated from 1:100,000 NHD and corrected based on local knowledge of stream networks.

Standards: Standards for high-resolution National Hydrographic Dataset, http://mapping.usgs.gov/standards/

What is needed? A sustained partnership of federal, state, and local agencies is needed to provide the resources necessary to complete this statewide, high-resolution NHD in a timely and efficient manner. As this project has matured, four key agencies have stepped forward to provide most of the resources. NDNR is providing technical and management oversight and office space on an in-kind basis. USGS is providing training, software tools, attribute conflation, and quality control on an in-kind work-share basis. NDEQ has provided grant funding, which is used primarily to pay for student digitizers. The Conservation and Survey Division – UNL is helping to recruit and provide students who are paid on a part-time basis to do the actual digitizing. Any significant changes in the commitment or resources available from any of these four agencies could dramatically impact this project.

At this point, the two primary areas of concern are the continuation of funding support by NDEQ for this interagency project and the potential adverse impact on the project that may result from the major reorganization of the mapping division of USGS. NDEQ has indicated that while they continue to support this interagency effort, some additional funding support from other agencies would make it easier for NDEQ to justify its continued financial support.

What is the likely source? A continued partnership of federal, state, and local agencies will be the key to completing this project.

Most appropriate data steward: Nebraska Department of Natural Resources

Maintenance: Not available at this time.

Theme: Digital Ortho Photography

Why it is a Priority. The Nebraska GIS Steering Committee and the Federal Geographic Data Committee have identified geo-referenced aerial photography as a high priority for development. This dataset is also a core geospatial dataset for the USGS National Map effort and the current guidelines for critical Homeland Security geospatial data needs. This database is among a select subset of framework databases that provide basic data infrastructure for a wide cross-section of GIS applications and geospatial data users.

Orthoimagery refers to aerial photography that has been geo-referenced and corrected for errors due to camera angle and terrain displacement. Orthoimagery is used as a base map for a wide variety of GIS and geospatial analyses. Because all of the points on orthophotos are geo-referenced, it can be used to collect the shape and approximate locational coordinates of any surface feature that can be seen in the photo. This characteristic of orthophotos makes them a very cost-effective means for deriving other needed geospatial databases. Orthoimagery also provides a valuable visual backdrop for many abstract GIS maps and analyses and as such provide an important real world context for an abstract map.

Current Status. As a result of an earlier workshare agreement between the Nebraska Department of Natural Resources (NDNR) and the USGS, a statewide dataset of 1:12,000 scale digital orthophoto quadrangles (DOQs) was completed in early 1999. This dataset was based on 1993 aerial photography. These digital statewide orthophotos are available from the Nebraska Department of Natural Resources (NDNR) at very limited or no cost.

New Statewide DOQs. In 2004, the NDNR and the USGS completed a three-year work-share agreement that developed revised, statewide DOQs based on newer 1999 imagery and 10-meter DEMs. Based on experience and need related to the earlier 1993 DOQs, these new DOQs were projected in both UTM and State Plane Coordinates.

In 2003, the Nebraska State Offices of the Farm Services Agency (FSA) and the Natural Resources Conservation Services (NRCS), both divisions of the US Dept. of Agriculture, cooperated to acquire true color, 1-meter resolution DOQs, for the entire geographic area of Nebraska. Unlike most of the other DOQs outlined in this section, these USDA DOQs were based on imagery acquired during "leaf-on" periods to meet the needs of USDA agencies to acquire information related to agricultural crop types. Because this 2003 imagery was more current than the DOQs based on 1999 imagery, there was a fair amount of interest in acquiring copies of this newer imagery by several state agencies. Initially the Nebraska GIS Steering Committee sought to secure copies of this newer DOQ data without charge. However, a USDA policy decision determined that, because of the voluminous nature of the data, the agency needed to be reimbursed for its copying costs. For this statewide imagery, these data copying costs amounted to approximately $44,000. While not an insignificant sum, this amounted to a very small fraction of the cost to actually develop the data. The GIS Steering Committee coordinated an interagency effort to pool resources to acquire this imagery and make it available for the broader Nebraska geospatial data user community. The Nebraska Dept. of Natural Resources has reprojected the data and is making it available in both UTM and State Plane Coordinates. The following agencies cooperated in this interagency effort:

Nebraska Dept. of Natural Resources	Nebraska Emergency Management Agency
Nebraska Dept. of Agriculture	Nebraska Health & Human Services System
Nebraska Dept. of Roads	Nebraska Game and Parks Commission'
Nebraska Public Power District	U.S. Fish and Wildlife Services

Local Area DOQs. DOQs at a higher levels of resolution are also available for the urban areas around the state's two population centers: Omaha, and Lincoln. For most of the Lincoln and Lancaster County area, updated 0.3-meter pixel resolution, color orthophotography was developed by the USGS, based on 2002 imagery, as part of an urban areas Homeland Security initiative. These USGS developed DOQs are publicly available based on standard USGS distribution policy and procedures. Compressed versions of these DOQs are also available online through the Nebraska Department of Natural Resources Databank. Also available for the City of Lincoln and Lancaster County are 1-foot resolution, black and white, 1997 digital orthophotography that covered 296 sections in and around Lincoln. In 1999, updated one-foot resolution DOQs were acquired to update 50 sections in rapidly changing areas in and around Lincoln and used to generate 1"=200' (1:2,400) digital orthophotography. The 1997 photography project also generated a digital terrain model (DTM) from which 2-foot contours were derived. This DTM was also used in the rectification process of the orthophotography acquired in the 1999 and 2002 updates. Access to the 1997 and 1999 DOQs is available only through specific arrangements with the City of Lincoln Public Works and Utilities Dept.

The City of Omaha initially developed DOQs in 1993 at 1/4-meter resolution for the eastern 2/3 of Douglas County. Later 1998 imagery was used to develop updated DOQs at the 1/8-meter and 1/4-meter resolution for the developed and non-developed areas of Douglas County respectively. More recently, a regional consortium developed 1/4 and 1/2-meter DOQs based on 2001 imagery for all of Douglas and Sarpy Counties and some of Washington and Pottawattamie, IA Counties. In 2004, an expanded regional consortium cooperated to acquire multi-resolution DOQs for Pottawattamie County in Iowa, the Nebraska counties of Douglas, Sarpy, and Washington, and the City of Fremont, Nebraska. This regional consortium included numerous local and state public entities and the USGS. The project included a mix of DOQ resolutions (2.5-inch, 5-inch, and 10-inch) and was based on spring 2004 imagery. The 10-inch DOQ was collected in both color and black and white, while the 2.5 and 5-inch DOQs was collected only in black and white only. It is currently expected that these new DOQs will be available early in 2005. Access to these higher level DOQs is available only through specific arrangements with the local partners. A local point of contact for access to existing DOQs and for future regional acquisitions is Scott McIntyre, City of Omaha Public Works, 404-444-5100, smcintyre@ci.omaha.ne.us.

Source: Completed statewide coverage is based on 1993 and 1999 NAPP source imagery. The USDA DOQs were based on 2003 imagery collect under the contact with the FSA. For information on local government high-resolution DOQs, contact the specific local government.

Standards: Statewide dataset of terrain-corrected (ortho-rectified) aerial photography at a 1:12,000 scale based on 1999 imagery and projected in both State Plane and UTM Coordinate Systems, http://mapping.usgs.gov/standards/

What is needed? With the completion of the 1999-based DOQs, based on the NDNR-USGS work-share agreement, it does not currently appear to be likely that further statewide DOQ update will be available through this unique work-share arrangement. Currently, the most promising avenues for future DOQ updates appear to be related to either future FSA-USDA DOQs or local/regional development efforts.

What is the likely source?

Future Statewide Imagery. The current FSA plans call for an annual DOQ update at the 2-meter resolution level, and then on a five-year cycle FSA will acquire 1-meter imagery. All of this imagery will be full-color, "leaf-on". With the acquisition of the 2003 FSA imagery, state agency will now be able to access how well this "leaf-on" imagery meets their needs. If it proves to be adequate, the GIS Steering Committee will need to explore ways to develop and maintain an interagency effort to partner with, or purchase copies of future FSA DOQs.

Urban High-resolution Imagery. The aspect of Nebraska where "leaf-on" imagery causes the most obvious application problems is in urban areas. In general, urban areas have a higher concentration of trees and they also desire a higher resolution imagery and increased spatial accuracy that most statewide DOQs require. The regional DOQ consortium developed in the Omaha area may provide the model to follow for future urban aerial imagery acquisition. By pooling their needs and resources, Nebraska urban areas may be able to substantially decrease the cost of this imagery acquisition. The GIS Steering Committee may have a role to play in helping to facilitate this interagency collaboration. In the near-term, an interest by the Nebraska Health and Human Services System (HHSS) to acquire high-resolution imagery for many of Nebraska urban areas for potential bio-terrorism applications is providing an

immediate stimulus for exploring the interest in such a collaborative effort. As this report is being drafted, the major municipalities have been contacted and many of them have expressed an interest in collaborating with the HHSS and the GIS Steering Committee to acquire new high-resolution imagery. One of major stumbling blocks is the differing fiscal timelines of the various public entities. Efforts are currently underway to explore avenues to work around this problem.

Most appropriate data steward: Nebraska Department of Natural Resources, US Geological Survey, and the Farm Service Agency - USDA for statewide DOQs and local government agencies in some cases.

Maintenance: Because of its wide range of applications, periodic updating of this dataset will be desired by a cross-section of state, local, and federal agencies. This is particularly true for areas in the eastern part of the state with higher population and higher levels of development activity. To some degree, the on-going local DOQ development efforts in the Omaha and Lincoln areas will address this need. As noted above, the development of a broader consortium of Nebraska municipalities may be an effective way to reduce the cost of periodic high-resolution imagery updates for municipalities. The continued acquisition of digital imagery by FSA-USDA is currently the only planned effort that will address this need for updated statewide imagery. If the recently acquired 2003 FSA "leaf-on" imagery appears to be adequate for a broad cross-section of state and local agency imagery uses, it may be appropriate to explore the development of a state government-level partnership with FSA to help facilitate the on-going acquisition of this statewide data.

Theme: Elevation

Why it is a priority. Surface elevation models are another geospatial dataset that has been prioritized for development by both the Nebraska GIS Steering Committee and the Federal Geographic Data Committee because it is one of a select subset of framework databases that provide basic data infrastructure for a wide cross-section of GIS applications and geospatial data users. This dataset is also a core geospatial dataset for the USGS National Map effort and the current guidelines for critical Homeland Security geospatial data needs. Most surface elevation models, commonly known as Digital Elevation Models (DEMs), are based on a regularly spaced grid of points for which the elevation of the earth's surface is known at each point.

The availability of DEMs for a given area enables a wide variety of GIS applications to be undertaken for which the relative altitude or slope of the earth's surface is important characteristics. The availability of DEMs also provide the data infrastructure to enable a GIS to generate a 3-D model of the earth's surface and drape aerial photography and/or conceptual project plans over that 3-D model for a "real world" perspective.

Current Status. As a result of the same three-year work-share agreement between the Nebraska Department of Natural Resources (NDNR) and the USGS that produced the Digital Orthophoto Quads (DOQs), a statewide dataset of 1:24,000-scale DEMs was completed for Nebraska in 1998. These DEMs are based on a grid of regularly spaced points, 30-meters apart, and were foundation databases used to develop the initial Nebraska DOQs.

In the follow-up NDNR –USGS work-share agreement to develop new 1999 DOQs, it was decided to also included a joint effort to reprocess the elevation data to create statewide 10-meter DEMs. This 10-meter DEM development effort has since been completed.

The City of Lincoln and Lancaster County, as a part of their 1997 orthophotography project, also generated a digital terrain model (DTM) from which 2-foot contours were derived. Theses DTMs cover 296 sections in and around the City of Lincoln. In 2004, USGS funded data acquisition and development for an enhanced DEM for most of the Lincoln - Lancaster area, utilizing LIDAR (LIght Detection And Ranging) technology to derive new 2-foot contours. This projected extended the area for which 2-foot contours were available. Additionally, the downtown area was done at a density of 1 meter spacing providing greater density from which to derive 3-D information. The processing of the raw LIDAR data that was collected is experimental and the resulting contours and 3-D data is being evaluated against current contours to judge the viability of acquiring data by these means. This project was a part of the USGS urban areas Homeland Security initiative.

An Omaha-area regional consortium has contracted with a vendor to develop enhanced DEMs and multi-resolution DOQs for Pottawattamie County in Iowa, the Nebraska counties of Douglas, Sarpy, and Washington, and the City of Fremont, Nebraska. This regional consortium includes numerous local and state public entities and the USGS. The enhanced DEM will consist of either 2- or 4-foot contours, with the 2-foot contours being developed for the highly urbanized areas. It is currently expected that these new DEMs will be available early in 2005. Access to these higher-level DEMs is available only through specific arrangements with the local partners or USGS. A local point of contact for access to existing DEMs and for future regional acquisitions is Scott McIntyre, City of Omaha Public Works, 404-444-5100, smcintyre@ci.omaha.ne.us.

Source: Complete statewide coverage based on 10-feet interval contours (hypsography digital line graph) derived from the existing USGS 7.5-minute topographic maps. See local contacts for specific information regarding enhanced local DEMs.

Standards: The 7.5-minute DEM data are digital representations of cartographic elevation data from USGS 7.5-minute topographic maps stored in a raster form. The DEMs consist of an array of elevations for ground positions at regularly spaced intervals. The DEM data are stored as profiles with a 10- or 30-meter square grid spacing along and between each profile, http://mapping.usgs.gov/standards/. See local contacts for specific information regarding enhanced local DEMs.

What is needed? At the time of this report, the development of enhanced statewide DEMs is not anticipated in the near future. The Nebraska GIS Steering Committee and state and local agencies should be proactive in responding to, and partnering with, local project initiatives that require the development of enhanced DEMS. As is illustrated by the Omaha-area consortium, these partnerships may enable the collection of enhanced DEM data for a broader geographic area, with limited incremental costs.

What is the likely source? Significant further enhancement of DEM data will likely depend upon project-specific partnerships between local, state, and federal entities and be focused on discrete geographic areas.

Most appropriate data steward: Nebraska Department of Natural Resources, US Geological Survey, and local government agencies

Maintenance: It is unlikely that there will be significant maintenance undertaken on this dataset on a statewide basis. Local DEM enhancements will be driven by local needs and realized through multi-agency partnerships.

Theme: Cadastral

Why it is a priority. The Nebraska GIS Steering Committee and the Federal Geographic Data Committee have both identified the cadastral/PLSS database as a high priority for development. This dataset is also a core geospatial dataset for the USGS National Map effort and the current draft guidelines for critical Homeland Security geospatial data needs. This database is among a select subset of framework databases that provide basic data infrastructure for a wide cross-section of GIS applications and geospatial data users. A geospatial cadastral database provides both standard identifiers and locational (latitude/longitude) coordinates for the PLSS corners.

The Public Land Survey System (PLSS) section corners in Nebraska are the basis for defining all land ownership in our state. Establishing reasonably accurate locational coordinates for these corners provides a necessary foundation for modernizing local government land records. There are approximately 100,000 such PLSS section corners in Nebraska, and they were originally surveyed roughly 125 years ago. In theory these PLSS section corners define one-mile squares, but the practical reality is that there are wide variations in the actual distance between the original placements of these corners.

However, it is the original placement of these corners that legally defines all land ownership parcels. Determining the "real world" coordinates of these original corner placements is one of the biggest hurdles that is slowing the adoption of modern geospatial technologies to manage and access land ownership records. A wide range of state, local and federal government agencies and private sector entities utilize land ownership data. Since the PLSS is the legal foundation for defining all land ownership parcels in Nebraska, and geospatial land ownership data is needed by a wide variety of entities, the development of a geospatial PLSS database must be a key component of the state's data infrastructure development plans.

Current Status. Currently there are two relatively low-resolution, statewide Nebraska PLSS databases available for public use. The Nebraska Department of Natural Resources (NDNR) developed a statewide PLSS database in the early 1990s and another was developed by the Bureau of Land Management (BLM) in 1997 to provide a basis for Nebraska PLSS pilot projects. Using different methodologies, both databases were derived from digitizing section corners, as shown on the USGS 1:24,000 topographic quad maps, and therefore have a spatial accuracy, which cannot be verified without extensive investigation. The two databases have been crosschecked and adjusted for obvious errors. While these two databases were derived from the same source data, they each incorporate some distinct built-in features (identification schemes, attributes, etc.), which facilitate their use in specific applications. The 2003 Nebraska GIS Strategic Plans called for the State Surveyors Office and the NDNR to work together to integrate the best features of these databases to create one standard cadastral database, with standard identifiers for all PLSS corners.

In some of Nebraska's more populous areas, local governments have independently developed enhanced cadastral databases. These locally derived cadastral databases reflect a significant investment by local governments to enhance the PLSS database. Unfortunately they cover only a relatively small geographic area of Nebraska's large land area.

A 1997-98 joint pilot project effort by the GIS Steering Committee and the State Surveyors Office tested both a methodology and an organizational model for the cooperative development of an enhanced cadastral database. This project focused on testing the applicability of a software methodology developed by the US Bureau of Land Management

(BLM). The pilot projects were also designed to test the organizational feasibility of relying primarily on local government partners to actually do the bulk of the data development. The results of the pilot project showed that the software approach was valid for the development of an enhanced, upgradeable cadastral. However, the organizational approach of relying primarily on local government personnel for data development did not appear to be workable in most situations. Since these initial cadastral pilot projects, this methodology has been used only to a limited extent, primarily due to the lack of resources to apply the methodology on a broader scale.

Current resources available in the State Surveyors Office allow that office to respond, in a limited manner, to unique opportunities to assist specific counties or agencies if they wish use this methodology to develop a cadastral database for their counties. Significantly more resources will be needed to develop a statewide, common reference cadastral database and thereby provide the data infrastructure needed for the statewide modernization of land records in compatible formats.

While the PLSS pilot project demonstrated the widespread support for cooperative cadastral efforts, it also suggested that totally voluntary, decentralized efforts are not a practical, cost-effective approach for the development of this database on a statewide basis. In response to the need to develop practical mechanisms for intergovernmental partnerships in this area, the Nebraska GIS Steering Committee worked with several key organizational players to outline and complete a Nebraska Land Record Modernization Study in 2003. This study was undertaken as part of cooperative agreement with USGS in support of Nebraska I-Team planning. The study researched the current status of land records in Nebraska local governments, looked at models for state/local cooperative land record programs in other states, and developed a conceptual design for a potential state/local land information program. The study found that in most Nebraska counties land records are quite dated, are not maintained using current technology, and as a result are not readily accessible or sharable. The study report recognized the important role of the cadastral database for land record modernization and recommended the development of a cooperative state/local Nebraska Land Information System Program. Additional discussion of this study and its recommendations is available as part of the Land Record Modernization goal discussion later in this report.

The need to develop practical mechanisms for intergovernmental partnerships and collaboration for the cadastral has also been recognized at the national level, as illustrated by a Western Governor's Association (WGA) cadastral resolution originally passed in June 2000. The importance of the cadastral database and the need for collaborative efforts to develop and maintain it was reaffirmed in a 2003 WGA resolution sponsored by Nebraska Governor Mike Johanns.

Source: Using different methodologies, the NDNR and the BLM databases were both derived from digitizing section corners, as shown on the USGS 1:24,000 topographic quad maps. The two databases were crosschecked and adjusted for obvious errors.

Standards: http://www.blm.gov/nils/

What is needed? While new technical issues and concerns will undoubtedly surface, many of the technical issues (methodology, standards, etc.) have been addressed as part of the earlier Nebraska PLSS pilot project efforts. To develop an enhanced statewide cadastral database a cooperative partnership between state, local and federal partners will probably be required, particularly for the rural areas of Nebraska. To move forward with the objective of

creating a standardized, statewide cadastral database, there are at least four areas of needed focus, in the near term.

Implementation of a Nebraska Land Information System Program . One of the biggest obstacles to moving forward with this objective was the need to engage the various stakeholders in a collaborative process to develop a rough consensus around an intergovernmental model that can facilitate the cooperative development and on-going maintenance of this core infrastructure database. Of necessity, such a process needed to make recommendations that involved legislation and funding issues. The Nebraska Land Record Modernization Study was designed to address this challenge and has produced a number of recommendations in this area. The Nebraska GIS Steering Committee should work with the Governor's Office, the Legislature, the Nebraska Association of County Officials and other interested parties to encourage consideration and implementation of these recommendations.

Merging Existing Low-Resolution PLSS Databases. There currently exist two relatively low-resolution, statewide PLSS databases available for public use. Both were derived from digitizing section corners as shown on the USGS 1:24,000 topographic quad maps and therefore have a spatial accuracy which cannot be verified without extensive investigation. A considerable amount of error checking has already been done between the two databases. Efforts by NDNR and the State Surveyors Office to integrate the best features of these two databases would create one standard, low-resolution PLSS database, with standard identifiers for all PLSS corners. This low-resolution PLSS database could then serve as an interim common reference cadastral database and also serve as the framework for on-going cooperative efforts to develop an enhanced cadastral database.

Cadastral Enhancement As Opportunities Allow. Until a more comprehensive approach has been developed for cadastral enhancement, the Nebraska GIS Steering Committee and the State Surveyors Office should actively encourage public and private entities to work with the State Surveyors Office to do any cadastral development in a format consistent with the database model developed in the PLSS pilot projects. To the extent that the State Surveyors Office has resources available, they will provide assistance to state, local and federal government entities in this pursuit.

What is the likely source? The State Surveyors Office and the Department of Natural Resources are the key players in making the integration of the two separate, but similar, low-resolution Nebraska PLSS databases happen. Leadership from the agencies and entities represented on the Land Record Modernization Study Advisory Committee (Governor's Policy Research Office, Nebraska Department of Property Assessment and Taxation, State Surveyor Office, State Chief Information Officer, Nebraska Association of County Officials, League of Nebraska Municipalities, and the Nebraska GIS Steering Committee) will be critical to moving the Nebraska Land Information System Program initiative forward.

Most appropriate data steward: Local governments and the State Surveyors Office

Maintenance: Database will likely require on-going maintenance to incorporate new and more accurate information on the position of PLSS corners as it becomes available.

Theme: Ground Transportation

Why it is a Priority. A comprehensive statewide transportation network database is another geospatial dataset that has been prioritized for development by both the Nebraska

GIS Steering Committee and the Federal Geographic Data Committee. This dataset is also a core geospatial dataset for the USGS National Map effort and the current guidelines for critical Homeland Security geospatial data needs. It is a priority for development because it is one of a select subset of framework databases that provide basic data infrastructure for a wide cross-section of GIS applications and geospatial data users.

A comprehensive statewide transportation network database would include an accurate geospatial representation of the location/route of the state's highways, roads and streets along with standard identifiers for each road feature and at least a minimum subset of attribute data related to those roads. For a state like Nebraska that covers a large geographic area, highways and other roads are critical components of the public infrastructure. As we move increasingly into the digital world, so too has digital geospatial information about those road networks become a critical component of the data infrastructure that is important for a wide range of applications. Among the applications for which geospatial road network databases are important are the following:

- Homeland Security, Public Safety and Emergency Response
- Transportation Planning
- Highway and Road Maintenance
- Economic Development
- Transportation Routing

Current Status. Nebraska has approximately 95,900 miles of state and local roads. Within the past decade, Nebraska Department of Roads (NDOR) has created, and continues to maintain geospatial graphics and associated attribute records for 9,967 miles of state-maintained highways and approximately 20,000 miles of local arterial routes and collector routes, at a scale of 1:24,000 Therefore approximately 30,000 miles of state and local roads are currently in the NDOR GIS transportation database, out of an overall statewide total of 95,900 miles.

In 1999-2000, NDOR worked with an interagency Transportation Database Advisory Committee of the Nebraska GIS Steering Committee to devise a two-phased strategy for how the remaining approximately 66,000 miles of local roads might be integrated into the NDOR statewide road network database to form an initial comprehensive ground transportation database. The first phase called for NDOR to convert existing graphic/non-GIS local roads files into GIS format so that they might be incorporated into the statewide geospatial transportation database. June 2002 was established as a target for completion of this initial phase. The local road vectors for all of Nebraska's counties (66,000 miles) have been completed. NDOR is currently working to edge match these local road vectors across the county line boundaries so that they can be integrated into a statewide database, as available resources allow. At the time of this report, approximate 60% of this edge-matching work for local roads has been completed.

Most of these local road vectors do not currently have any intelligence (attributes) associated with them. The second phase of the Advisory Committee's recommendations called for the incorporation of a minimum subset of attribute information to be associated with these local road vectors. These standard identifiers would provide a means for maintaining and upgrading the local transportation features in the NDOR database. NDOR is currently in the process of associating unique road intersection identifiers for all of the local roads in its database. At the time of this report, approximately 25% of this local road intersection identifier work has been completed.

Transportation – Street Address Database Advisory Committee. During 2004, the Nebraska GIS Steering Committee convened an intergovernmental Advisory Committee on Transportation/Street Address Databases. This Advisory Committee explored the feasibility, merits and issues involved in developing and maintaining a combined statewide transportation/street address database and recommended this combined approach to develop and maintain these databases be pursed. The Committee worked with NDOR to define a minimum subset of standard attributes that should be included in a comprehensive statewide transportation or combined transportation/street address database. As part of this effort, the Advisory Committee defined a system of standard transportation feature identifiers that could provide the basis for on going sharing and updating of these databases between state, local and federal entities. The NDOR currently plans a pilot project for 2005 to evaluate this combined database approach. Additional information on this combined approach is available in the Street Address section of this report.

Source: Files were originally created for each county using Intergraph's World Mapping software. An additional file was created for each county for digitizing the city plats. The USGS DLG's were then brought into the files. From that point several data sources have been used to enhance and tighten this transportation layer, such as NDOR General County Maps and City Plat series, the State Tourist Map, Highway Inventory Notes, GPS, etc.

Standards: Existing NDOR Transportation Network Database meets 1:24,000 National Map Accuracy Standards and incorporates NDOR feature identifiers and attributes. Current plans call for the incorporate a common identifier scheme consistent with the NSDI Framework Transportation Identification Standards, http://www.fgdc.gov/standards/status/sub5_7.html.

What is needed? Effort and resources are needed on several tracks to complete the integration of all local roads into a comprehensive statewide GIS ground transportation layer (with street addresses potentially incorporated) and to develop a system whereby it can be updated and maintained.

Completion of Statewide Local Road Vectors and Identifiers. One track would involve the continued work by NDOR staff, or contractors, to complete the cross county line edge-matching of local road vectors to make available a comprehensive statewide vector transportation data layer. A parallel effort would be the completion of the current NDOR effort to associate unique identifier with every road intersection. Combined, these two parallel efforts will allow for the development of an initial comprehensive statewide state/local transportation database for Nebraska.

Pilot Project to Implement Advisory Committee Recommendations. This track would involve NDOR in a process of implementing and testing the Advisory Committee's recommendations for the features of a combined transportation/street address database. This pilot would seek to incorporate local data into the NDOR database and thereby update the transportation data to include updated street centerline data and street address data. This pilot effort needs to be coordinated with efforts by the Nebraska Public Service Commission to develop local enhanced street centerline – address data as part of their Phase II Enhanced E911 development *(more on this in the Street Address Database section of this report).*

The Center for Advanced Land Management Information Technology (CALMIT) – UNL has already completed a considerable amount of work in collecting available local street address data as part of their Home Security/Bioterrorism contracts with the Nebraska Emergency

Management Agency and the Nebraska Health and Human Services System. This existing combination of Census TIGER data and local data will provide a good starting point for testing the Advisory Committee recommendations.

What is the likely source? Nebraska Department of Roads personnel, with cooperation from local governments and the Nebraska Public Service Commission, will likely be the primary means of supporting this effort. The Nebraska GIS Steering Committee will take a leading role in helping to develop and facilitate the on-going collaboration.

NDOR could accomplish all this using their personnel. However, it may take a quite awhile to get it done. If this effort were prioritized, additional resources for coordination could potentially be available and technical production could be contracted to private vendors. This effort should be closely coordinated with current discussions related to the interagency need for a comprehensive statewide street centerline/address database for Homeland Security, E911 implementation and a wide variety of other applications.

Most appropriate data steward: Nebraska Department of Roads and local governments

Maintenance: Nebraska Department of Roads, Nebraska Public Service Commission, and local governments

Theme: Administrative Boundaries

Why it is a Priority. A set of geospatial databases that provide both the location and shape of the key governmental unit boundaries (municipal, congressional or legislative district, counties, etc.) is another dataset that has been prioritized for development by both the Nebraska GIS Steering Committee and the Federal Geographic Data Committee. This dataset is also a core geospatial dataset for the USGS National Map effort and the guidelines for critical Homeland Security geospatial data needs. It is a priority for development because it is one of a select subset of framework databases that provide basic data infrastructure for a wide cross-section of GIS applications and geospatial data users.

A wide variety of data collection activities and public policy decisions involve referring to a given activity or resource relative to its location within a particular governmental unit. The availability of geospatial databases that outlines these governmental unit boundaries allows the use of geospatial technology to analyze data relative to its particular governmental unit and facilitates achieving public policy objectives relative to those governmental units.

Current Status. A Governmental Units Database Advisory Committee identified a core set of governmental unit boundary databases that are widely needed, assessed their current availability, and developed some recommendations for their development, maintenance and distribution. That Advisory Committee found that the following core geospatial governmental unit databases have been developed by a variety of agencies and are currently available to the general public and public agencies:

Legislative Districts	Congressional Districts	State Board of Education
Board of Regents	Supreme Court Districts	Game and Parks Districts
NRD Districts	Counties	Township/Range
Fire Districts	School Districts	

The Advisory Committee also found that while information on the governmental boundaries listed below was available in a paper format, it was not apparent where current information on these boundaries can be reliably accessed in a digital, geospatial data format.

Municipal Boundaries Tribal Lands

Since the Advisory Committee issued its report, the Nebraska Department of Roads has indicated that they will develop and maintain a coverage of the Nebraska municipal boundaries. Since the Advisory Committee issued its original report, the Nebraska GIS Steering Committee has been informed that digital geospatial Tribal Land boundaries, within the State of Nebraska, are available through the Bureau of Indian Affairs.

The Advisory Committee noted that most of these boundary databases were maintained by and available from a variety of agencies. However, for the average GIS user it was not always readily apparent how one would go about finding and getting a copy of these databases. The Advisory Committee also noted that while these governmental boundary databases are available, many of them are not currently documented with the standardized metadata, which facilitates both their cataloging in geospatial data clearinghouses and allows users to evaluate and properly utilize the databases.

As a result of 2002 discussions, three additional administrative boundary databases were identified as needed by several participating agencies:

Federally-owned land State-owned lands Local health organization boundaries*

*As a result of their Bio-terrorism related GIS development efforts the Nebraska Health and Human Services System has developed a coverage of regional health department boundaries.

Source: This information is derived from a variety of sources and maintained by several agencies. For example, most of the electoral districts are based on state legislation, and in the past the geospatial databases have been developed and maintained by the GIS staff based in the Clerk of the Legislature. The school district boundary database is maintained by the Nebraska Department of Education based on information from local school districts. The municipal boundaries database has been developed by the Bureau of the Census and will be updated by the Nebraska Department of Roads based on information provided by municipalities in their annual reports related to cost sharing for road/street maintenance.

Standards: The standards for these databases vary related to the specific agency maintaining the databases. Most of the boundary databases are at a 1:24,000 scale of spatial accuracy.

What is needed? There are two primary areas of need related to this data theme in Nebraska. There is a need for an interagency effort to get these varied databases documented with FGDC-compliant metadata and then to list them on an FGDC-compliant clearinghouse with links to online access points. In addition to these overall concerns, there is also a need to address how the electoral district databases will be maintained and distributed now that the Clerk of the Legislature no longer has a GIS specialist on staff.

What is the likely source? The Nebraska GIS Steering Committee can offer encouragement and support for agency efforts to develop metadata to document these datasets, but the metadata ultimately must be developed and maintained by the agency

maintaining the specific databases. The GIS Steering Committee has a key role to play in developing an enhanced comprehensive Nebraska geospatial data clearinghouse so that these databases can be easily located and accessed. *(see the Data Sharing and Distribution goal for further information).*

Most appropriate data steward:

Clerk of the Legislature *(needs to be revisited given staff changes)*
- Legislative Districts
- Congressional Districts
- State Board of Education
- Board of Regents
- Supreme Court Districts

Nebraska Department of Natural Resources
- NRD Districts
- Counties
- Fire Districts

Nebraska Game and Parks Commission
- Game and Parks Districts
- Game and Parks Lands

Nebraska Department of Education
- School Districts

Nebraska Department of Roads
- Municipal Boundaries

Nebraska State Surveyor
- Township/Range

Bureau of Indian Affairs
- Tribal Lands

Nebraska Health and Human Services System
- Regional Health Department Boundaries

Data stewardship responsibility for these datasets have yet to be defined

Federally-owned land State-owned lands

Maintenance: Maintenance needs and plans vary considerable by database and agency

Theme: Geodetic Control

Why it is a Priority. The Federal Geographic Data Committee has identified Geodetic Control as a high priority for development. This database is among a select subset of framework databases that provide basic data infrastructure for a wide cross-section of GIS applications and geospatial data users. This database provides the foundation for tying all other geospatial databases to a common spatial reference framework and therefore enables other databases to be combined and analyzed based on this common spatial reference.

Current Status. A 1998 report, developed by the State Surveyor, on the Geodetic Control data available for Nebraska noted the following. "The current data set is somewhat fragmented. National Geodetic Survey (NGS) provides information on all control, which has been submitted, for inclusion in their data. This information is disseminated in many forms including optical discs and the Internet. Individual agencies such as Nebraska Department of Roads, Nebraska Department of Natural Resources, and County Surveyors maintain records of monuments not submitted for inclusion in the NGS set. In some cases this information is difficult to locate and not available in digital form.

"The creation of a database for geodetic control monuments, beyond that maintained by NGS may not be a good idea at this time. The use of GPS for survey quality geodetic control is increasing as accuracy improves and cost declines. Users of GPS do not have the same requirements as those who employ conventional surveying methods. Conventional surveying methods require control monuments to be reasonably close to the work area (usually 5

kilometers or less). Survey quality GPS methods extend this range considerably to a point where the monuments contained within the NGS data are usually adequate. Local counties that have enacted zoning ordinances requiring geo-referencing for new subdivisions have a need for control beyond that provided by NGS. Many Land Surveyors do not have GPS capability and make the connections by conventional survey methods. In the case of Lancaster County, the County Surveyor has improved the density of the control and makes it available to the public."

In 1996, NGS and several Nebraska partners cooperated in the development of High Accuracy Reference Network (HARN) for Nebraska. This HARN network consists of 214 monumented control stations scattered across Nebraska for which the locational coordinates have been determined, to a very high degree of accuracy, with the use of Global Positioning Satellite (GPS) technology. This HARN data is available through the NGS database.

The current assessment is that for a wide range of GIS applications the current statewide geodetic Nebraska control network and its associated NGS database probably provide adequate horizontal control. However, for some local GIS implementation projects, there may be merit in establishing additional local geodetic control. At that time, it was the assessment of this working group that efforts to enhance vertical control (elevation) should be of a higher priority than efforts to enhance horizontal control.

At the time of this report, there is discussion between the State Surveyors Office and the Nebraska Department of Roads regarding the merits of making their extensive in-house databases of geodetic control points available on the web so that this information is more accessible.

Source: The geodetic control data for Nebraska comes from multiple sources. While available from multiple sources, the geodetic control data that has been incorporated into and is available through the National Spatial Reference System (NSRS), maintained by NGS, must meet clearly defined standards outlined in the NGS Blue Book for the various orders of horizontal and vertical accuracy. Specific state and local agencies are the only source for information on the geodetic control data maintained by those agencies outside of the NSRS.

Standards: http://www.ngs.noaa.gov/FGCS/BlueBook/

What is needed? The current assessment is that, with the increasing availability of GPS technology, the currently available geodetic control network is adequate for a wide range of applications. The exception would be local applications such as engineering developments or local government development of geospatial land records. In these situations, a project-specific densification of the local geodetic control network is probably warranted. As additional resources become available, efforts to enhance the vertical control network would have considerable benefit.

The recent discussions between the State Surveyors Office and the Nebraska Department of Roads regarding the possibility of making their extensive databases of geodetic control points available through the web offers the possibility of making Nebraska geodetic control points be more readily accessible to users. If NDOR and the State Surveyors Office ultimately pursue this potential initiative, the GIS Steering Committee should work closely with them to achieve the maximum benefit can be achieved for the broader GIS/geospatial data user community

What is the likely source? A partnership between the Nebraska Department of Roads and the State Surveyors Office is the most likely source for new initiatives in this area.

Most appropriate data steward: National Geodetic Survey and State Surveyors Office

Maintenance: National Geodetic Survey and local governments

NON-FRAMEWORK LAYERS

In addition to the Framework data layers outlined above, the Nebraska GIS Steering Committee has also identified four additional datasets that it feels should be priorities for statewide development due to their unique importance to Nebraska. These four additional priority data layers are: ground water features – wells, soil surveys, street addresses and watershed boundaries.

Theme: Ground Water Features - Wells

Why it is a priority. In late 1998 the Nebraska GIS Steering Committee authorized the formation of an interagency Water Resources Database Advisory Committee to study the need for water-related geospatial databases and make recommendations. The Advisory Committee identified 26 water-related databases needed by the interagency Committee members. Of those 26, the Advisory Committee ranked the surface water features as its highest priority and the groundwater/water wells database as its number two priority for development.

Because of the importance of water to Nebraska, numerous state, local and federal agencies collect, analyze and use data related to water wells and the associated groundwater. As a result of a variety of programs in different agencies, a large volume of data related to wells and groundwater has been collected, and continues to be collected. Unfortunately, the lack of a universally applied water well identification scheme makes it very difficult and costly to integrate this data across the different programs and agencies. For many programs, enhancing the ability to share, integrate and analyze groundwater data across programs and agencies would provide a more cost-effective way to achieve program goals and to monitor program results.

Personnel from a given agency frequently need to make repeat visits, over a period of time, to a particular well to collect water samples. In some areas, there are numerous wells located in close proximity to each other without obvious physical features to make them uniquely stand out. Absent a unique identifier placed on a particular well, it is sometimes difficult to insure that agency personnel are indeed getting repeat samples from the same well. This difficulty is compounded if the sample visits are separated by several months of time and/or made by different personnel from the same or a different agency. This difficulty is further compounded when one attempts to integrate data collected from supposedly the same well by multiple agencies, without the benefit of a unique well identifier placed on that particular water well to provide a common unique reference.

In a similar manner, accurate information on the location of water wells is increasingly important to many programs. The water well locational data most readily available to most users is from the Registered Wells Database, which contains information on over 100,000 registered wells and is maintained by Dept. of Natural Resources (NDNR). In most cases, the

locational data in this database was derived from mathematical estimates based on the center of PLSS sections or distances from the PLSS corners, as recorded on the well registration form. For many of today's applications, this locational information is not sufficiently accurate, particularly when there are multiple wells in relatively close proximity.

Current Status. Over a period of years, different agencies have developed and maintained separate identification schemes that are used to index the water well and groundwater data they collect and maintain. The closest approximation we have to a universal well identifier system is the Registered Well ID maintained by NDNR. Unfortunately, even though they are legally required to be registered, many wells are not. Even when they are registered, it is sometimes difficult to determine the registered well ID when one is in the field taking samples, as there is no identifier placed on the well itself. Because of this problem, a few Natural Resource Districts (NRDs) have begun to place their agency-specific identifier tags on wells as they visit them in the field.

Because of the growing importance of having relatively accurate information on well locations, many agencies are now investing public resources to use Global Positioning Satellite (GPS) technology to collect more accurate locational coordinates on water wells. Unfortunately, there has been no systematic, interagency program in place to make this more accurate locational information collected on specific water wells generally available to the broader user community.

An interagency Working Group was established by the Water Resources Database Advisory Committee to research and develop an action plan to address the need for a standard reference water well database, with enhanced locational coordinates for wells. That Working Group initially focused on the challenge of making enhanced data on the location of water wells available to the larger user community. A 1999 survey of state, local and federal agencies discovered that GPS readings had already been collected on over 17,500 wells by NRDs, NHHS, NDEQ, and USGS, with future plans of collecting GPS readings on over 6,500 wells/year. The problem was lack of any systematic method for making the results of these individual agency efforts available to the larger community. The Working Group developed consensus methodologies for documenting how enhanced locational data on wells was derived and general conceptual agreement for procedures to integrate this data into the Registered Wells Database maintained by NDNR. The Nebraska GIS Steering Committee passed a resolution supporting the Working Group's recommendations and urging agencies' support for their implementation.

Since the issuance of this Working Group report, initial follow-up efforts have focused on initiatives to get more wells legally registered and therefore incorporated into the Registered Wells database. The Nebraska Legislature, in 2001, passed new statutory language requiring that the licensed well drillers, instead of the well owners, register new wells. To further facilitate well registration, NDNR has also developed an online well registration process. In addition, there has been an increased focus on interagency efforts (NDNR, NHHS, and NRDs) to identify existing, non-registered wells and encourage the owners (public and private) to register these wells, as required by statutes. State statues have also been changed so that there is no longer a fee associated with changing/updating information on a well registration. It is expected that this will result in a considerable increase in well owners and NRDs filing updated information on well location and other characteristics.

Recent legislative initiatives to facilitate integrated (ground and surface) water management planning (LB 962) is also increasing the interest in getting GPS information on water wells

integrated into the Registered Wells database. Under current law, if a well is not registered, it is illegal in terms of water use. In many areas of Nebraska, water is currently over-allocated and so there is a renewed interest in getting wells registered to protect water rights.

Source: The water well information currently contained in the Registered Wells Database maintained by the Department of Natural Resources (NDNR) is derived primarily from well registration forms submitted by well owners. It is assumed by those knowledgeable in this field that there are very large numbers of wells that are not registered. For the vast majority of the registered wells, the locational coordinates have been derived from section or quarter-section centroids, or estimated from approximate distance measurements listed on the well registration form. Some of the more recent data comes from a change in state statutes that make well drillers responsible for registering the wells.

Standards: The quality and accuracy of the estimated locational coordinates varies tremendously. Draft metadata standards to assist in documenting the source and quality of the locational coordinates have yet to be implemented.

What is needed? Efforts to incorporate the enhanced GPS well locational data, which has been collected by other agencies, into the NDNR Registered Wells Database have been delayed due to the lack of available resources at NDNR. As additional resources become available, it is hoped that this GPS locational data collected by one agency can be shared with others by incorporating it in the Registered Wells database.

What is the likely source? Reallocation of scarce technical resources within NDNR, increased appropriation from Legislature, grants or assistance from other agencies.

Most appropriate data steward: Nebraska Department of Natural Resources

Maintenance: Nebraska Department of Natural Resources and Natural Resources Districts

Theme: Soil Surveys

Why it is a Priority. Because of the overall importance of agriculture to Nebraska's long-term social and economic well being, the development of digital soils data is another statewide geospatial database that has been prioritized for development by the GIS Steering Committee. The development of high resolution, digital county soil survey data, in a geospatial format, will provide key data that is needed for farm and ranch management applications to take advantage of GIS technology. Geospatial soil data also provides key information that can be used, in combination with other data, for siting facilities such as landfills, housing developments, and sanitary lagoons. This digital geospatial soils data is also an important factor in determining the value of property for assessment purposes. The federal government has prioritized the development of digital SSURGO soils data and made available to US Natural Resources Conservation Service (NRCS) specially earmarked funding to support these efforts during a five-year window of FY 1997-2002.

The NRCS originally developed the paper County Soil Survey Manuals. These county soil manuals contain maps that outline the approximate shape and location of areas with similar soil characteristics, and provide detailed associated information on the characteristics of each particular soil type. The NRCS developed national standards (known as SSURGO) for the conversion of these paper maps to digital geospatial format. As part of the process of conversion to digital SSURGO format, the spatial accuracy of the county soil maps were enhanced by recompiling the maps on a DOQ base map. When one considers that Nebraska includes approximately 49,500,000 acres, or 77,355 square miles of area, the overwhelming magnitude of the task of converting these paper soil maps to digital geospatial format becomes apparent.

Current Status. 2004 saw the completion of a five-year effort by three agencies (USDA-NRCS, Conservation and Survey Division-UNL, and the Nebraska Department of Natural Resources) to develop statewide digital SSURGO county soil surveys at a 1:24,000 map scale.

Source: The data is being derived from existing county soil surveys recompiled on 1993 DOQ/DEM base maps.

Standards: http://www.ftw.nrcs.usda.gov/ssur_data.html

What is needed? Project completed, limited on-going maintenance and revision anticipated.

What is the likely source? Congress and State Legislature

Most appropriate data steward: Natural Resources Conservation Service - USDA

Maintenance: Natural Resources Conservation Service – USDA

Theme: Street Addresses

Why it is a Priority. As the human services and Homeland Security-related applications (education, welfare, public safety, emergency response, etc.) of GIS technology have grown, a parallel need for a geospatial street address databases has also grown. An assessment of Homeland Security and emergency planning and response needs related to GIS identified a

statewide street address database as one of the priority needs. An effort to implement enhanced E911 emergency response for emergency calls generated from cellular phones has also heightened the demand for this data. A geospatial street address database includes a map of street centerlines and attribute data that provides the street address ranges for each side of a street or road segment (i.e. for each city block). Such a geospatial street address database provides the foundation data for a process known as geo-coding — the efficient, large-scale determination of the locational coordinates for common street addresses. This then allows common street addresses to be plotted on a map and integrated with a wide variety of other spatial data. While human services-related applications are one of most common areas of need for geospatial street address databases, they are also used for other applications such as determining the spatial coordinates for regulated facilities, emergency response or transportation routing.

Current Status. There is a growing use and interest in street address geospatial databases by numerous state and local agencies. However it was the need for this data for Homeland Security and Bio-terrorism and enhanced E911 applications that is currently provided the most immediate impetus and potentially the resources needed to move forward on the further development of this data for Nebraska. Another potential major user is the Nebraska Department of Revenue in its efforts to work with catalog and online sales vendors to collect sales tax.

Last year (2003), the GIS Steering Committee worked with the State CIO, the Center for Advanced Land Management Information Technology - UNL (CALMIT), the Nebraska Health and Human Services System (NHHS), and the Nebraska Emergency Management Agency (NEMA) to convene a working group of interested agencies to explore alternatives for developing or acquiring geospatial street address data for Nebraska. At that time, it was decided that as an interim solution, the best approach would be to enhance publicly available U.S. Census Bureau street address data (TIGER) with whatever local government-produced digital street address data was available.

Based on this working group decision, the GIS Steering Committee Coordinator worked with CALMIT staff to collect available street address data from local governments. In most cases, local governments with street address data in the appropriate digital format were willing to share their data to assist with this project. The following seventeen counties provided their locally developed data for this project.

Antelope	Boyd	Cass
Clay	Douglas	Furnas
Gage	Harlan	Holt
Lancaster	Phelps	Platte
Saline	Sarpy	Seward
Scottsbluff	Thurston	

CALMIT staff, working under a contract with NEMA and NHHS, integrated the more accurate locally produced data from these counties into the Census TIGER data to produce an enhanced TIGER dataset for the state. The resulting street address database is similar to what is available through private vendors, but without the licensing restrictions. This is composite, "best available" dataset is currently the best available statewide street centerline – address database for Nebraska and is available through CALMIT-UNL. Unfortunately, as originally conceived, this project did not include any provisions for the on-going maintenance and updating of this dataset, and so the current dataset represents the "best available", as of the fall of 2003.

In 2004, three new initiatives have developed that, if they can be successfully coordinated, hold a promise for the development of a system that could provide on-going updates to a statewide, "best available", street centerline-address dataset.

Public Service Commission. One of those initiatives involves the Nebraska Public Service Commission (NPSC) and its interest in developing street centerline-address databases for selected counties to facilitate those counties development of enhanced Phase-II E911 capabilities. As an increasing percentage of E911 calls to emergency dispatch centers originate from cellular phones, there is an increasing need to be able to quickly determine the physical location from which those emergency calls originate. A current street centerline-address database to the particular area is one of the critical components of a broader system needed to accomplish this in an automated and expeditious manner. The NPSC is working with approximately 40 Nebraska counties to help them accomplish this Phase-II enhanced E911 implement. Funding is available to the NPSC through a surcharge on cellular calls, and the NPSC is currently considering proposals that would involve contracting with private vendors to develop and maintain this data for specific counties. While the NPSC has indicated that it has no interest in integrating this data into a statewide database and serving it to the broader user community, it has indicated a willingness to make it available to some other state agency to undertake that on-going integration task.

Database Advisory Committee. Another 2004 initiative was an Advisory Committee on Transportation – Street Address Databases created by the GIS Steering Committee. This Advisory Committee was charged with exploring the possibilities of developing an integrated system for maintaining both a statewide geospatial transportation database and a street centerline-address database. The committee was charged with determining if this integrated approach was both feasible and practical, and with making recommendations for implementation, if practical. The Advisory Committee did determine that this was a practical approach, and the Nebraska Department of Roads (NDOR) has indicated a willingness to take on this on-going data steward-integrator role for a combined statewide transportation-street address database. The working assumption of this model is that multiple entities (i.e., NPSC, local governments, NDOR, US Census) will be developing enhanced, updated street centerline-address data for specific areas of the state on an on-going basis. The NDOR will collect this new data, assess its merits relative to existing data for a particular area, and, if appropriate, integrate the new data into the statewide database. A starting point for this effort will be the state-local transportation database currently under development by NDOR. At this point this transportation database includes no address-related attribute information. The Advisory Committee has developed draft database standards based on these working assumptions and the NDOR is currently preparing a pilot project to evaluate the model and database standards.

FGDC Grant. A final related initiative is a grant proposal submitted by the Nebraska Department of Natural Resources and funded by the Federal Geographic Data Committee (FGDC). This grant, related to USGS National Map program, included pass-through funding of $25,000 to help support NDOR effort to develop a system to develop, maintain and serve a statewide "best available" street centerline-address database for Nebraska. As currently conceived, this effort will serve to support the initial development and implementation of the recommendations of the Advisory Committee on Transportation – Street Address Databases and is due to be completed by the middle of 2005.

Source: Road and street centerline data and address ranges will come from a range of data developers (NPSC, local governments, NDOR, US Census, private vendors) and will be

integrated into a "best available" street centerline-address database as they become available and NDOR has the resources available for assessment and integration work.

Standards: Not available at this time

What is needed? Last year's TIGER enhancement effort led by CALMIT was a significant step forward to address the growing need for a statewide street address database. However, the challenge now is two-fold, a). to develop a system whereby this dynamic data being developed by multiply entities can be collected, integrated, and maintained on an on-going basis; and b). to increase the geographic area for which updated and enhanced street centerline-address data is available.

Coordinate with Nebraska Public Service Commission's E911 Effort. While still evolving in its approach, the effort by the Public Service Commission to facilitate Phase-II E911 implementation offers the best hope for working with local governments to develop on-going updates of dynamic street centerline-address data. NPSC has a clearly defined need and a related funding source. As the PSC approach evolves, the GIS Steering Committee needs to work closely with NPSC to maintain its awareness of the needs of other public entities for this same data. Significant cost-efficiencies can be gained if the public resource investment made by NPSC in street address data can be leveraged to help fill the wide-ranging needs of other public entities for this type of data. The GIS Steering Committee should continue to work with the NPSC to explore how the needs of these other public agencies for street address data can be best integrated into NPSC's database procurement process. Where this is beyond the practical reach of the NPSC's process, the GIS Steering Committee should work with NDOR and other agencies to develop systems to take the data generated by NPSC and integrate and enhance it with other data and then make it available to the broader user community.

Encourage and Support NDOR's Transportation-Street Address Database Efforts. The Nebraska Dept. of Roads' (NDOR) willingness to take on the responsibility for the on-going maintenance of this key database is a critical component of any systematic approach to address in data need. While there will be technical challenges, it is likely that even more challenging will be the process of working through the interagency, intergovernmental understanding and agreements. The GIS Steering Committee should continue to play an active role in helping NDOR work through these interagency processes and developing agreements that can sustain an on-going process. The GIS Steering Committee should also continue to assist and support NDOR as it seeks to find additional resources that it might need to sustain this interagency effort. In this regard, the GIS Steering Committee should also continue to work with both NDOR and NDNR to facilitate the collaborative processes involved in fulfilling the commitments related to the FGDC National Map grant.

Relationship of Street Address Database to Other Initiatives. In developing a system to enhance and maintain a statewide street address database, consideration should also be given to continuing efforts to explore the possible synergies with several other potentially related public initiatives.

> The Public Service Commission and Cellular E911. As noted above, the Nebraska Public Service Commission has been charged with the responsibility of facilitating and overseeing the advanced levels of E911 implementation. Because current street address maps are key elements of automatic E911 locator systems, NPSC has a strong stake in the development and maintenance of these databases. The GIS Steering Committee should

continue to closely coordinate with NPSC as it develops systems to develop and maintain this data, so we can help to achieve the maximum overall return on these public investments.

Sales Tax from Catalog and Online Sales. As a growing amount of retail transactions occur via catalog or online sales, this is having a significant negative impact on state sales tax collections. States, including Nebraska, have begun to explore with out-of-state vendors methodologies that might be used to re-capturing this lost revenue. It appears that one of the key components for achieving this is to provide the vendors with easy access to sales tax rates by address. Using GIS technology, coupled with geospatial maps of municipal boundaries and current street centerline-address databases is the most efficient way to develop, maintain, and provide this information to vendors. The GIS Steering Committee should work closely with the Nebraska Dept. of Revenue as it explores how it might develop systems to provide this address/sales tax rate information to vendors.

Department of Roads - NECTAR. The Department of Roads is developing an in-house Intranet web based Geographic Information Systems (GIS) decision-support tool they are calling Nebraska Enterprise Centerline Transportation Attribute Resource (NECTAR). NECTAR uses web-mapping technology and allows the user to query multiple databases containing road, bridge, railroad, average daily traffic (ADT) location, and a variety of other transportation data and maps the results. Some local government road departments have also expressed an interest in having the ability to input local road/bridge information into this system and to having access to the system for queries, reports and display of local road data. NDOR is currently exploring this possibility.

State Patrol Computer-Aided Dispatch. The Nebraska State Patrol has expressed its interest in developing a statewide Computer Aided Dispatch system to assist it in dispatching and tracking State Patrol officers to incidents throughout the state. Among other components, such a system will require a comprehensive, statewide geospatial street centerline-address database.

Homeland Security and Bio-terrorism. The need for this database for a wide range of Homeland Security and Bio-terrorism applications has already led to significant developments in this area. However, the continuing need for current and enhanced street address data raises the possibility of further partnerships around the further enhancement of this data.

Voter Registration. As Nebraska seeks to improve its voter outreach and voter registration in response to the federal Help America Vote Act (HAVA), current and accurate geospatial street address data can be a key component of the systems that help to validate voter registrations and organize voter outreach efforts. The GIS Steering Committee should work with the Nebraska Secretary of State to explore how its programs might benefit from street address database development efforts.

One Call – Diggers Hotline. The One Call –Diggers Hotline is an effort to provide a statewide centralized point of contact for someone intending to dig so that entities with buried underground utilities have the opportunity to mark the location of those utilities prior to someone digging. One of the stated needs of the entity operating the diggers hotline is an up-to-date street centerline-address database. They receive calls from all over the state and most of those calls are referenced with a street address. They have

found existing street centerline-address databases to be error-filled and inadequate to the task.

Nebraska Land Information System Program. Reports resulting from the Nebraska Land Records Modernization Study *(see Land Records Modernization Initiative in this report)* included recommendations that locally developed street address databases be among those geospatial databases eligible for funding under a proposed Nebraska Land Information System Program. If implemented, such an approach would provide another means to encourage and assist local governments to develop, maintain, and share this widely needed geospatial data. Efforts to develop on-going systems to maintain and enhance a statewide street address database should be closely coordinated with any potential implementation of the proposed Nebraska Land Information System Program.

What is the likely source? The Nebraska GIS Steering Committee must provide the leadership and coordination to pull this potential interagency effort together. To achieve the maximum synergy from these separate, but related public efforts, the GIS Steering Committee must work closely with the Governor's Policy Research Office, the state's CIO, and the lead agencies (NDOR, NPSC, Sec. of State, NEMA, NHHSS, CALMIT, NITC) for an array of public initiatives.

Most appropriate data steward: Local governments, Public Service Commission and Nebraska Dept. of Roads.

Maintenance: On-going maintenance, with updated information provided by local governments, must be a significant component of any implementation plan.

Watershed Boundary Database

Why it is a Priority. A variety of public agencies (local, state, and federal) and private entities utilize standardized watershed delineations (hydrologic units) for a wide variety of natural resource planning and regulatory applications. Hydrologic unit boundaries define the areal extent of surface water drainage to a downstream "pour" point. A standardized national watershed boundary dataset (WBD), which subdivides watershed areas into sub-basin areas of 250,000 acres or more (average size 450,000 acres) has been in existence and widely used for several years. This dataset is commonly known as the 4th level or 8-digit HUCs (Hydrologic Unit Catalog), in reference to the standardized, 8-digit numerical identifiers associated with each delineated sub-basin *(see the table below).*

For many applications, these 8-digit watershed subdivisions are still too coarse or cover too large of an area (450,000 acre average). Consequently, new national standards have been developed to guide the development of standardized watershed delineation databases that further subdivide basins into smaller watershed areas (levels 5th and 6th). As these new 5th and 6th level watershed delineations are developed and certified, they are very likely to be integrated and standardized into a wide range of federal, state, and local planning and regulatory applications.

SUMMATION OF GUIDELINES FOR SIZE AND NUMBER CRITERIA

Hydrologic Unit Level	Name	Coding Digits	Size (in acres)	Number
1	Region	2		
2	Sub-region	4		
3	Basin	6		
4	Sub-basin	8	250,000+ (aver. 450,000)	
5	Watershed	10	40,000-250,000	5 to 15
6	Sub-watershed	12	10,000-40,000	5 to 15

Current Status. Because Nebraska agencies recognized some time ago the need for a further sub-division of watershed areas, the Nebraska Department of Natural Resources led an interagency effort several years to develop a statewide watershed database that further sub-divided watersheds beyond the national 4th level, 8-digit HUC. Since that time, these further sub-divisions of watersheds have seen widespread adoption and use in Nebraska. Unfortunately, because this database was developed prior to the adoption of national standards for 5th and 6th level watershed delineation, there are numerous situations in which these existing sub-divisions fall outside the new national standards.

In 2003 the GIS Steering Committee convened an interagency working group to review the WBD standards relative to the current watershed databases available for Nebraska. Based on the strong interest by the Nebraska Office of the Natural Resources Conservation Services (NRCS) – USDA, the GIS Steering Committee determined sufficient interest and resources were available to justify revising existing watershed boundaries based on the new WBD standards. In the fall of 2003, NRCS secured funding for the project. Overall, the goal of the Nebraska WBD Delineation Project is to provide a statewide, hydrologically correct, seamless and consistent GIS database at a scale of 1:24,000. The database must follow national standards and match the USGS topographical 7.5-minute quads.

The Nebraska WBD delineation project commenced early in 2004 on what is anticipated to be a two-year project. Initial efforts have focused on the watershed areas that cross the state boundaries, so that these watershed delineation efforts can be coordinated with those of adjacent states. At the time of this report, this state boundary watershed work is nearing completion. Efforts in 2005 will focus on the remaining watershed in the internal area of Nebraska. Completion is currently expected at the end of 2005. The Nebraska Office of the Natural Resources Conservation Services (NRCS) – USDA is coordinating this overall effort

For the most part, watershed boundary delineation will be driven by the actual topology of the land. However, because it is anticipated that this database will be officially adopted for a wide variety of planning and regulatory applications, the Nebraska WBD working group (now known as Interagency Hydrologic Unit Group (IHUG)) will seek to ensure that interested entities have the opportunity to comment on the draft boundaries for each watershed and sub-watershed area. Another objective of the Nebraska IHUG is to develop a standardized watershed boundary dataset that retains as much of the existing watershed subdivision dataset characteristics as is practical, while still being consistent with the new national standards. Further information on this project is available at: "http://dnrdata.dnr.state.ne.us/wbd/index.asp".

Source: The following datasets will be used as inputs for developing the WBD:

- Earth Resources Observations Systems (EROS) Data Center, National Elevation Dataset Hydrologic Derivatives (EDNA) http://edcnts12.cr.usgs.gov/edna
- Current WBD datasets from adjacent states
- Existing watershed subdivisions developed by the Nebraska Department of Natural Resources (NDNR) will be used as a guide, and line work and attribution will be used where it complies to national guidelines meeting the requirements of size, number and uniformity per nested level
- DRGs, DOQs and other useful maps that are obtained

Standards: http://www.ftw.nrcs.usda.gov/huc_data.html

What is needed? The Nebraska Office of NRCS is providing basic funding for the Nebraska WBD Delineation Project. NRCS is also providing a lead staff coordinator for the project. Several state and local agencies have committed to provide representatives to serve on a Nebraska Interagency Hydrologic Unit Group (IHUG) to provide general project guidance and oversight. Interested parties will need to follow the progress of draft WBD development and provide comments and feedback on specific draft boundaries in a timely manner.

What is the likely source? The Nebraska Office of the NRCS, USDA, is the lead agency and primary funder of this project. Shandy Bittle, NRCS-USDA, 402-437-4020, Shandy.Bittle@ne.usda.gov, is the overall project coordinator

Most appropriate data steward: Natural Resources Conservation Service-USDA and the Nebraska Department of Natural Resources

Maintenance: Not available at this time.

NON - DATA DEVELOPMENT GOALS AND INITIATIVES

In addition to the long-range goal related to the development of priority databases, the GIS Steering Committee has identified six other long-range goals or initiatives that it sees as directly related to *"Building a Spatial Data Infrastructure for Nebraska"*. This section provides an update on activities and plans related to these non-data development initiatives.

HOMELAND SECURITY AND EMERGENCY MANAGEMENT*. Continue to assist, as requested, the Nebraska Emergency Management Agency and other emergency and public safety agencies in planning for short and long-term GIS and geospatial data requirements to support Homeland Security and other public safety initiatives.*

Why it is a Priority. Timely, accurate information, easily accessed and capable of being shared across federal, state, and local political jurisdictions is fundamental to strengthening the decision-making capability of those tasked with the homeland security and emergency management missions. It is estimated that geographic location is a key component of approximately 80-90% of all government data. Geospatial information technology utilizes the locational component of data to provide the capability to quickly visualize activity patterns, map locations, and understand the multi-layered geospatial context of emergency situations.

The potential applications of the GIS technology to emergency preparedness and response have been clear for some time. In the aftermath of the September 11, 2001 attacks, it become even clearer that in emergency situations of whatever origin, our nation and/or state is dependent on rapid access to and application of many types of current, accurate geospatial information. Among the critically needed information is the following:

- Facilities and operations susceptible to attack.
- Critical infrastructure, including telecommunications; electrical power systems; gas and oil production, storage and distribution; banking and finance; water supply systems; emergency services.
- Accurate employment data tied to specific locations.
- Detailed and current "framework" data, including orthophotography, transportation, elevation, political boundaries, property ownership, hydrography and geodetic control.

GIS technology is capable of quickly rendering one or several layers of digital geospatial data into map-like products. These systems can facilitate near real-time performance of a wide range of relevant geospatial analyses. These characteristics make geographic information technologies, combined with appropriate sets of geospatial information, an invaluable tool for the handling, display, and analysis of information involved in every aspect of emergency management.

Current Status. At the time of the September 11th attacks, the Nebraska Emergency Management Agency (NEMA) and the Nebraska Health and Human Services System (NHHSS) had very limited GIS capabilities. In the aftermath of September 11th, NEMA and NHHSS indicated their interest in rapidly developing GIS capability. Since that time, the GIS Steering Committee has worked with and supported the efforts of both agencies to develop GIS capabilities. Early in this process, the GIS Steering Committee worked with both agencies to conduct a preliminary GIS needs assessment and produce a report entitled, *"Recommendations for Emergency Management and Bio-terrorism Response in Nebraska"* which is available at: *"http://www.calmit.unl.edu/gis/Homeland_Sec_Recmd_11-4-03.pdf"*.

Since that interim report, both NEMA and NHHSS have moved forward to rapidly address many of the issues and recommendations outlined in the preliminary needs assessment. Much of this work has been accomplished through separate interagency agreements between each agency and the Center for Advanced Land Management Information Technology (CALMIT) at UNL.

Many of the needed geospatial databases have been assembled from other agencies on separate GIS servers. A large-scale effort has been completed to develop a comprehensive critical infrastructure database for Nebraska. An enhanced interim statewide street address database has been developed for use in further geo-coding of existing databases and emergency response situations. GIS is beginning to be integrated into the emergency planning and drills of both agencies. Further GIS needs assessment has been undertaken in both agencies and staff training has occurred. GIS tools and analysis have also been integrated into several on-going agency applications.

Where We Are Going. With the GIS implementation strides taken by both NEMA and NHHSS since 2001, it is clear that both agencies have made a commitment to develop GIS as an integral part of the tools they have available for planning, analysis and emergency response. The GIS Steering Committee should continue to support GIS implementation in these critical areas by working with NEMA and NHHSS and focusing on the interagency needs and coordination such as the following.

Integration into broader GIS community initiatives for maximum synergy. There are some areas in which additional efforts should be made to integrate Homeland Security and Bioterrorism initiatives into closely paralleling initiatives by the broader GIS community. Examples include the effort to develop a state enterprise geospatial data center and efforts by NDOR to create and maintain a comprehensive statewide transportation-street address data layer. It is expected that all initiatives could gain from such synergy, but with the awareness that in some cases security concerns may limit the level of interoperability.

Data development and maintenance needs. Homeland Security and Bioterrorism GIS applications rely on many databases that are developed and maintained external to the lead agencies involved in those programs. Many of these databases are dynamic in nature and long-term arrangements need to be made to ensure that the most recent data is readily available in times of emergency. Some of the databases needed for these applications are either not yet available or still require considerable enhancement work. Two key examples are street addresses and property parcels. Both of these databases originate primarily at the local government level and their statewide availability is spotty. Continued efforts by the GIS Steering Committee are needed to facilitate the statewide development and integration of these key databases.

Interagency effort to define a vision of the ultimate enterprise emergency response GIS. As NEMA and NHHSS have moved to rapidly develop GIS capabilities, they have of necessity, focused fairly closely on their internal agency needs, and as necessary, on the needs of key partner agencies. Long-term development of an integrated enterprise emergency response GIS might be enhanced by inviting a broad array of agencies to jointly define what they would need from such an enterprise emergency response GIS and how they would see it structured and functioning. Facilitating the development of a broader enterprise vision of an emergency response GIS is possibly a role that the GIS Steering Committee, working closely with NEMA and NHHSS, should explore.

LAND RECORDS MODERNIZATION INITIATIVE. *Promote and facilitate local government land record modernization and GIS development.*

Why it is a Priority. One of the most promising and cost-effective application areas of GIS technology is the modernization of how local government land records are maintained and accessed. The property parcel/land record information maintained by local governments is also one of the geospatial databases that are needed by a wide variety of state, local and federal agencies and private entities. It is in the interest of the broader GIS user community that this land record information be developed in a standardized geospatial format and that it is accessible to multiple users at the local, state and federal level. Because of the limited resources available at the local government level, partnerships will be necessary in many areas to facilitate the development and maintenance of this data.

Current Status. The status of related efforts to develop statewide digital geo-referenced aerial photography and a Public Land Survey System database are outlined elsewhere in this report, under the Priority Database Development and Maintenance Initiative. Together, these two databases would provide the foundation base maps necessary for the development of geospatial property parcel databases.

In Nebraska, land records are maintained at the local government level and the dynamic public information related to changing land ownership flows through local government offices. Therefore, as a necessity, local governments must be integrally involved in any land record modernization effort. However, many local governments do not have the resources to undertake land record modernization by themselves. Many regional, state and federal agencies also have an interest in the development and maintenance of modern geospatial land records in a consistent and statewide-compatible format. In Nebraska, one of the biggest hurdles to land record modernization is the lack of a consensus around a policy and structural framework that will facilitate local, regional, state, and federal agencies collaboration, on an on-going basis, in support of land record modernization.

In pursuit of such a policy/structural consensus, the GIS Steering Committee worked with many of the key institutional players to outline a Nebraska Land Record Modernization Study. The goal of this study was to both outline the issues and possible alternatives for a collaborative land record modernization initiative and to bring together the key players and constituencies in a process to explore the possibilities for a consensus approach.

That study is complete and the reports and recommendations are available online at: http://www.calmit.unl.edu/gis/LRM_Index-Page.htm. Among the key findings are the following:

- Only 21% of Nebraska counties use and maintain parcel mapping in computerized format.
- Local government spends $1.9 million or more annually for parcel map maintenance and updates.
- Because so much of the parcel data is maintained manually, the usefulness of that information is questionable (e.g. the average vintage of cadastral data is 1981—some is as old as 1940).
- 86% of Nebraska counties indicate their update cycle for parcel mapping is greater than 10 years.
- The cost for major revisions to parcel map information range to $1.6 million statewide—a cost that could potentially be entirely avoided if parcel maps were maintained digitally.
- Because hardcopy land records are difficult to access, aggregate, and analyze, the need for automated data extends beyond parcel maps to a variety of spatial and non-spatial

data that is regularly used by local, regional, and state governments, the private sector, citizens, and the academic community.

- Local governments spend upwards of $2 million for the creation, development, and distribution of GIS data.
- Maintenance of the Public Land Survey System costs local governments $700,000 or more annually.

The study also found that there are many positives upon which to build a modern land information system in Nebraska.

- Virtually all of those agencies surveyed have access to information technology. Ninety-three percent of counties and 100% of cities surveyed reported that they had some form of Internet access.
- There is a statewide data communications network that extends to every county in the State (the "AS400 Network") with connections ranging from 56k to T1. There are also several other, though less pervasive, networks available.
- While not suitable for all purposes, the statewide digital orthophotography provides a consistent geographically referenced base map that meets many, if not most, state and local business purposes.
- The Nebraska High Accuracy Reference Network (HARN) offers more than 200 high quality geodetic control stations acquired using GPS survey methods. These HARN stations may be used by local surveyors, engineers, photogrammetrists, and others to support mapping, Public Land Survey System (PLSS) updates and maintenance, and geodetic control densification.

The overall recommendation of the study was a proposal to develop a Land Information System Program for Nebraska, which would seek to bring about statewide land records modernization on two interdependent fronts.

First, the Nebraska GIS Steering Committee would work with local governments to develop an automated, parcel-based land information system to be analytical and geographically referenced to support mapping, information, and business systems needs.

Second, the Nebraska Department of Property Assessment and Taxation would work with local governments to build a statewide interoperable assessment database and system to automate a variety of non-spatial land records, including ownership and assessment databases and related conveyance and land management documents.

Among the features envisioned in the recommended Land Information System Program are the following:

Voluntary and Locally Driven. Local governments will be able to opt in or out and may take charge of their own systems development and operations.

Incentive-Based Policies. Participants in the program will be entitled to financial and other incentives if they adhere to program requirements.

Standards Based. Technical program requirements will be based on "best practices" standards. Projects and products will be flexible to meet the needs of newcomers to modernization as well as those who have already made investments.

Coordination, Collaboration, and Regionalization. Program incentives will be directed to those efforts that will benefit multiple agencies and jurisdictions through automation,

business process improvement and coordination. Regionalization of program and system development, particularly in rural areas, will be encouraged.

Technical Assistance. Part of the incentive for program participation will come in the form of technical assistance from the State. Technical assistance may include template specifications, project assistance or management, and education.

Where We Are Going. The completion of the Nebraska Land Record Modernization Study has provided a wealth of background information on the status of land record management in Nebraska and institutional models that have worked in other states to address modern land information needs. The study documented that while some of the more populous areas of Nebraska have developed modern land information systems, most of the local governments in the state still rely on outdated technology. The study found that while large amounts of public funds are expended annually to maintain these records, in most cases the land ownership maps are out-dated and the maps and related information are not readily accessible without physically traveling to seats of county government.

The study concluded by proposing the development of a Land Information System Program for Nebraska. The study also outlined the broad program features and strategies that represented the areas of consensus of the wide range of institutional players involved in the study. During this year's 2004 legislative session, a bill was introduced (LB 1169), the Nebraska Land Information System Program Act, which included many of the recommendations developed from the Land Record Modernization Study. The Nebraska Association of County Officials (NACO) supported the bill and the Steering Committee's Coordinator provided background testimony on the findings of the land records modernization study at the legislative hearing on the bill. This bill did not advance to become law during the short 2004 legislative session. Since the end of the legislative session, the GIS Steering Committee members have participated with a range of interested parties in further discussions with the goal of developing a refined legislative proposal that might be considered in the 2005 legislative session.

The GIS Steering Committee should continue to work with the Governors Office, the Nebraska Legislature, the and local government officials to ensure that policy makers are aware of this study and it recommendations. The GIS Steering Committee should also support efforts by policy makers to develop the means to implement the study's recommendations.

DATA SHARING AND DISTRIBUTION. *Develop structures, standards, and processes that facilitate easy access to, integration, and usability of publicly available geospatial data.*

Why it is a Priority. A key component of any coordinated GIS development strategy must be the development and maintenance of mechanisms to facilitate the sharing of widely needed geospatial data. In the aftermath of the September 11th terrorist attack, the importance of reliable, efficient mechanisms for geospatial data sharing became very evident. In times of an emergency, responders need quick access to the most accurate and current data available, and in data formats that can be quickly and easily integrated.

There are several essential elements to such a data-sharing strategy. These include the easy ability to discover the existence of data and how it may be accessed. Most GIS experts would suggest that 80 to 90% of GIS implementation costs are commonly related to geospatial data development or acquisition. One of the surest ways to reduce the level of investment required for geospatial data development is to locate existing geospatial datasets, developed by someone else, that will meet some or all of your data needs. Geospatial data clearinghouses are a key component of the evolving spatial data infrastructure. Data clearinghouses are intended to

provide a systematic approach for cataloging and locating available geospatial data for a particular area or region.

The documentation of the data to facilitate its proper use is another essential element of facilitating data sharing. If someone gets a geospatial dataset from someone else it is difficult to determine the appropriate use of that data if it is not documented with metadata (data about the data). Likewise, when there is a substantial public investment in the development of a database, the parallel development of metadata is important to preserve the public investment in that data. Without adequate metadata documentation, when the key staff members who originally developed a given database leave the organization, it is sometimes difficult to justify continuing to use that database. Without adequate documentation to explain how database figures or coding were derived it is difficult to defend policy or regulatory decisions based on that data. Standardized metadata also provides the basis for potential users to find available geospatial data through geospatial database search tools that have been developed around metadata standards.

The recent evolution of GIS technology in the area of Internet Map Services (IMS) is providing a relatively new and powerful approach for sharing geospatial data. IMS technology allows one entity to "serve up" one or more geospatial databases via the Internet. Other interested entities can then selectively link to one or more of these "served" geospatial databases and engage in a "live" interaction and analysis with various IMS "served" databases that may be on their computer or served from multiple servers in multiple locations around the world. This means that each database users does not need to find and get a their own copy each database on their computer, but instead can link to databases in multiple locations and display and analyze interrelationships via the Internet.

Current Status. The Nebraska GIS Steering Committee has long recognized facilitating data sharing and distribution as one of its priority goals. In 2002, an Advisory Committee on Facilitating Geospatial Data Sharing issued a report entitled, "Facilitating Geospatial Data Sharing in Nebraska" (http://www.calmit.unl.edu/gis/Nebr_DASC_Recmd_final.pdf). Among the short and long-term recommendations of that report were the following:

Short-term, limited resource efforts

- Merge two existing (partial) clearinghouses into one enterprise clearinghouse hosted by the Nebraska Dept. of Natural Resources.
- Nebraska GIS Steering Committee to be ultimate owner of Clearinghouse with NDNR the trustee charged with operational responsibility, subject to available resources.
- Survey agencies to identify existing Nebraska-related geospatial data
- Encourage development of metadata documentation of existing data and listing on enterprise clearinghouse

Longer-term institutional structures and policies

- As resources become available, work with NDNR to develop an enhanced enterprise geospatial data clearinghouse/center to serve the Nebraska geospatial data user community and provide a broader range of data access and support services outlined below:
  - Online Catalog and Data Access Point
  - Help Desk
  - Data Integration Services

- Interactive Internet Mapping Support Center
- Technical Assistance
- Pooling Resources for Cooperative Projects

Where We Are Going. The Advisory Committee's recommendations still represent the consensus view of how the GIS Steering Committee and the GIS user community can best address its data sharing and distribution needs. Two factors have provided significant impediments to implementing these recommendations over the last year. The most significant was the lack of available resources due to the serious state budget shortfall. The absence of any dedicated funding source for this enterprise effort meant that when resources became very tight, this program moved to the "back burner". The other factor was an internal agency review of the Nebraska Department of Natural Resources' information technology mission and structure, which was undertaken in 2003.

MOU on Geospatial Data Center. To clarify their mutual understandings, the Nebraska Department of Natural Resources and the Nebraska GIS Steering Committee have developed a Memorandum of Understanding regarding the operation and governance of a Nebraska Geospatial Data Center. As part of this MOU, both parties agree to provide leadership and program oversight for the cooperative activities of the Data Center. Both parties also agree that NDNR will be the trustee of the Data Center and will have operational responsibilities. It is further agreed that working closely with NDNR, the Steering Committee is the party responsible for defining overall Data Center policies and direction. The Steering Committee will also have the responsibility for taking the lead in pursuing any additional resources needed to insure adequate support for Data Center-related functions and for taking an on-going, active role in assisting NDNR to explore opportunities for partnerships and collaboration as a means to enhance the services available through the Data Center.

Enterprise Clearinghouse. In 2004, significant progress was made in beginning to implement some of the recommendations of this 2002 report. Due in part to a grant from the State Records Board, the NDNR has moved forward to develop an enterprise Nebraska Geospatial Data Center web presence. As part of this Data Center, an online, searchable geospatial data clearinghouse has been developed that is consistent with national Federal Geospatial Data Committee (FGDC) clearinghouse network standards. At this point, most of the data listed in the clearinghouse is housed on the NDNR servers, but the intent is to develop an enterprise clearinghouse to provide information on Nebraska-related geospatial data hosted on a wide range of state, local, federal and private servers. To further that goal, NDNR has also developed an online metadata-lite entry form. This online form will allow other agencies to enter the minimum of amount of metadata (data about data) that is necessary to use the online search capabilities of the FGDC clearinghouse network.

Metadata Technical Assistance. The metadata-lite version of metadata provides only the bare-bones version of metadata that allows a potential user to search for and access available geospatial data. Full metadata documentation provides much more robust information regarding the nature of the dataset, how it was developed, the meaning of its data values, and its appropriate use. Full metadata is important for enabling others to appropriate use geospatial data they did not develop and it helps to protect an agency's investment in geospatial data development. However, full metadata is fairly complex and rather tedious to develop and so data developers tend to defer metadata development. To help encourage and facilitate the documentation of geospatial databases with full metadata, efforts are currently underway to help personnel in UNL Libraries to develop this knowledge, with the understanding that they will be

willing to devote some resources to providing encouragement and technical assistance to others in this regard.

Nebraska Data Service to the National Map. Another aspect of the evolution of enterprise geospatial data services at NDNR is the signing of another MOU with the US Geological Survey to serve a range of Nebraska-related geospatial databases to the USGS National Map via Internet Map Server technology. The National Map is a national effort, lead by the USGS, to replace the paper 7.5 minute topographical maps with maps served on the Internet and generated with data produced and served by users around the country. To further this effort, the GIS Steering Committee has also worked with NDNR to submit a grant proposal that was ultimately funded by the FGDC. This grant will support acquisition of additional software and hardware, the process of data and ultimately the serving of additional data to the National Map. The development of this Nebraska node to the National Map will dovetail nicely with the longer-term vision of developing a multi-faceted geospatial data center, as recommended by the Advisory Committee report. This same grant also served to highlight the need for and the possibilities of the Geospatial Data Center evolving to act as a point at which resources might be pooled for interagency projects. Roughly half of the grants funds will be provided to the Dept. of Roads to support its work to create a "best available" statewide street centerline-address database. This data will also be served to the National Map.

TECHNICAL ASSISTANCE. *Provide technical assistance to local governments and state agencies.*

Why it is a Priority. With the growing interest in GIS, the technology is no longer just being used by a limited number of fairly large public agencies. It is becoming a powerful mainstream information technology, with a wide variety of state and local level agencies either developing or having an interest in developing GIS applications. With this growing interest in the technology, there is a parallel growing need for technical assistance to help these agencies develop their GIS/geospatial data or applications. These technical assistance needs range from guidance in designing and planning the development of an in-house capability; to specialized GIS application development; to large-scale geospatial data development projects; to on-going development and maintenance of specific GIS applications.

Up to this point, the primary operational model in Nebraska has been for each agency or local government to develop and maintain its own in-house GIS capability. This has worked fairly well in that most of the early-adopter agencies already had technical personnel on board and had a fairly wide range of GIS/geospatial applications they wanted to develop. With more and more agencies expressing interest in the technology, it is time to consider the merits and efficiencies that might be gained by arrangements to aggregate the demand and resources available to support these technical services. The need for this pooling of demand and resources is particularly apparent in the rural and non-urban areas of Nebraska, where individual local governments or agencies frequently lack the resources to support the technical services they need to adequately fulfill their responsibilities. At the state government level, it is a question of the optimum use of public resources. Should each new agency interested in utilizing GIS technology develop its own in-house capabilities or should other models be explored for how best to meet this growing interest in the technology.

Over the last several years, the need for GIS technical assistance has been raised and highlighted in numerous studies and reports undertaken under the auspices of the GIS Steering Committee. The November 2002 Annual Report and Strategic Plan outlined many of these previous calls for technical assistance. The Advisory Committee on Data Sharing and Distribution report also

noted the need for technical assistance. That Advisory Committee recommended that limited technical assistance should be part of the mission of an enterprise-wide geospatial clearinghouse/data center. The need for technical assistance was also noted in the GIS Steering Committee's preliminary GIS needs assessment for the Nebraska Emergency Management Agency (NEMA), *"Recommendations for Emergency Management and Bioterrorism Response in Nebraska"*.

The most recent reaffirmation of the need for technical assistance was included in the reports resulting from the Nebraska Land Record Modernization Study.

> *"**A major need identified is technical assistance**. For the program to be successful, local agencies and staff will have to be educated and trained on the new technologies and procedures. Because of the distributed and decentralized nature of the spatial data part of the program, the need for technical assistance will be more profound."*

Current Status. The need for differing types of GIS-related technical assistance continues to manifest itself. In some cases it is from agencies or entities that are potential new users of the technology (Dept. of Agriculture, Dept. of Economic Development, Dept. of Revenue). In others, it is from agencies that are current users of GIS technology, but want to utilize some new aspects of the technology for which they currently have no expertise (i.e. Internet Map Servers).

Without the existence of a GIS-related service bureau for state agencies, each of these needs or requests for GIS technical assistance is met or unmet on a rather ad hoc basis. The Center for Advanced Land Management Information Technology (CALMIT) at UNL has evolved to take on some of the larger needs, through contractual arrangements with the Nebraska Health and Human Services System (NHHSS) and the Nebraska Emergency Management Agency (NEMA). In other cases, private sector firms are providing this service through contractual arrangements (Public Service Commission and E911). In some instances, multiple agencies invest developing somewhat duplicative skill sets due to the absence of service bureau capabilities. And in other cases, new interests in potential GIS applications is dropped or deferred due to the high technical and resource hurdles related to getting started.

Where We Are Going. The wide-ranging need for GIS technical assistance for new users of GIS technology continues to be documented by an on-going array of studies and reports. The contractual relationship that was developed between CALMIT and NEMA and NHHSS provides one model for how these technical assistance needs might be meet. At the time of this report, it is not clear whether this is a unique, short-term, application-specific model or a potentially longer-term solution that might be built upon to meet a broader array of technical assistance needs. The recommendations of the Advisory Committee on Data Sharing and Distribution also envisioned the development of at least limited technical assistance through the Nebraska Geospatial Data Center located at the Dept. of Natural Resources. However, at this time the lack of specific resources and mandate have limited this to very ad hoc basis.

Most of the key issues and concerns involved in enhancing the technical assistance available to local governments and state agencies are related more to intergovernmental public policy and structural issues than they are to technical issues. The study and recommendations helped to clarify the needs and issues involved. However to be effective, these studies and recommendations must then be followed up with interagency public policy efforts to build the institutional structures required to address these technical assistance needs on an on-going basis.

EDUCATION/OUTREACH. *Promote an educational outreach program designed to maximize the overall return on public investments in the development of geographically referenced*

databases and GIS systems by providing educational materials, presentations and coordination services to the public officials and technical staff who will be making these investment decisions.

Why it is a Priority. While GIS can no longer be considered a new technology, it is still new and relatively complex for many of the agencies and policy makers who are now considering their initial public investments in the technology. Without education and/or technical assistance these public sector decision-makers can easily make costly mistakes in their initial GIS investment decisions. The risks of costly mistakes have less to do with the hardware and software, and more with data purchase or development decisions. This need is particularly acute in relation to local governments. Local governments make substantial investments in mapping and aerial photography in the course of fulfilling their areas of responsibility. For many county commissioners, county assessors, and agency directors these are new areas of expertise. Public investments in a GIS educational/outreach program, directed toward government decision-makers, would increase the probability of wise public investment decisions in GIS technology and data. Such an education program would increase the likelihood that costly geospatial databases developed for one area and application, would not only work as intended for that application, but also for other areas and applications. Such an education/outreach program is a vital component of a coordinated GIS development effort.

Current Status. The GIS Steering Committee has attempted to address these GIS-related outreach, education and coordination needs. However, its efforts have, of necessity, been limited because of the lack of program resources. The GIS Steering Committee works cooperative with the non-profit Nebraska GIS/LIS Association to facilitate communication/ coordination within the growing GIS community. Over the last several years, the Steering Committee has regularly staffed an educational booth at the Nebraska Association of County Officials (NACO) Annual Conference and has provided other presentations as the opportunity and resources allow. The Multipurpose Land Information System Guidebook project, outlined under the Land Records Modernization initiative, is focused on developing guidelines to assist local government officials to make wise public investments in GIS technology.

In 2004 the GIS Steering Committee has begun organizing and planning work with the Nebraska GIS/LIS Association for a 2005 Nebraska GIS Symposium to held in Lincoln. In the past, over 300 registrants have participated in this multi-day educational event, which covered a broad array of GIS-related topics.

Where We Are Going. The GIS Steering Committee will continue to work with groups like the Nebraska GIS/LIS Association, NACO and the League of Nebraska Municipalities to encourage and provide GIS-related education and outreach programs. Unless additional resources are made available, all of these efforts will be handicapped by the lack of program resources.

STRENGTHEN COORDINATION CAPACITY. *Strengthen the GIS Steering Committee's operational capability to facilitate the implementation of priority geospatial database development decisions, data sharing, interagency/intergovernmental partnerships, and agencies' utilization of GIS technology.*

Why it is a Priority. While Nebraska statutes define broad areas of responsibilities for the Nebraska GIS Steering Committee, the Committee has very little in the way of independent authority and/or resources to seriously address those responsibilities. With limited authority and no operational capability or budget, Steering Committee decisions and priorities can only be

implemented through the sponsorship and active support of independent state, local or federal agencies.

The coordination of GIS development for the overall good of the broad and growing Nebraska GIS user community is a unique and challenging mission not specifically shared by any other public entity. In some specific instances other agencies' missions and priorities are congruent with those of the Steering Committee and in those cases those agencies may take the lead on a project on behalf of the Steering Committee. However, where this parallel sense of priorities does not exist, the Steering Committee is seriously limited in its ability to implement its priorities.

GIS and geospatial data are key information technology tools that are becoming integrated into the way a wide array of public agencies fulfill their missions. Core framework geospatial datasets are vital components of our shared information technology infrastructure. Higher long-term public costs will be the result, if we do not put in place effective mechanisms to develop and maintain common, shared versions of these key pieces of our shared data infrastructure.

Many of today's major geospatial data development efforts are only feasible through intergovernmental partnerships. The Steering Committee's current structure is poorly suited to facilitating the actual implementation of those partnership projects. The availability of seed funding specifically dedicated to collaborative GIS development efforts, combined with the financial management capability to efficiently combine and leverage other intergovernmental resources could greatly enhance the Steering Committee's ability to implement collaborative GIS development projects.

In addition to highlighting the potential benefits of seed funding for collaborative geospatial data development, past GIS Strategic Plans have also outlined several other initiatives that would help to strengthen the overall coordination capacity of the Nebraska GIS Steering Committee:

- GIS Service Bureau,
- GIS Education/Outreach Program, and a
- Geospatial Data Clearinghouse

Current Status. The GIS Steering Committee continues to act on its commitment to the Federal Geographic Data Committee and the US Office of Management and Budget to take the lead in coordinating state, federal, local and private planning efforts for Nebraska-related geospatial data and the broader National Spatial Data Infrastructure (NSDI). As part of this planning process, two meetings of the larger GIS community were held in 2004 and several Advisory Committees have worked on issues raised in these meetings. This Annual Report is designed to also serve as a Nebraska Strategic Plan to help guide state, local and federal agency geospatial data efforts and facilitate collaborative projects related to Nebraska. Current plans call for convening semi-annual meetings of interested participants from federal, state, local and private entities to provide a forum to further explore and develop collaborative NSDI projects.

The development of a Nebraska Geospatial Data Center, which began in 2004, offers a potential to help strengthen overall geospatial data coordinating efforts in Nebraska. This Data Center, which is a cooperative endeavor between the Nebraska Department of Natural Resources and the GIS Steering Committee, should provide a central place around which enterprise-wide data sharing activities can coalesce. In making its recommendations for the development of this Data Center, the interagency Advisory Committee also recommended that overall coordination capabilities would be enhanced if this Data Center could evolve to include mechanisms for

pooling intergovernmental financial resources, Internet mapping services, data integration services and technical assistance. Little progress has been made on implementing these recommendations for enterprise-wide services, primarily due to the lack of resources.

The Nebraska Land Record Modernization Study report proposed the development of a Land Information System Program for Nebraska. One of the major component of that proposed program would be a GIS Steering Committee lead effort to work with local governments to develop an automated, parcel based land information system to be analytical and geographically referenced to support mapping, information, and business systems.

In 2004, the National State Geographic Information Council (NSGIC) conducted a survey of state GIS coordinating structures and capabilities, relative to a model for successful GIS coordination that it had developed the previous year. In the report issued based on a self-report of states, Nebraska was found to meet 5 of 9 suggested model coordinating criteria (http://www.nsgic.org/hot_topics/model_states/GIT_Coordination_final.pdf)

Where We Are Going. The Steering Committee does a good job of bringing agencies and different levels of government together to define common needs and develop collaborative plans for addressing those needs. As presently structured, the Steering Committee is poorly equipped to take the next steps to help implement those collaborative plans. Unfortunately, there is also not another agency or entity currently in place that can readily take on the responsibility for implementing the increasing number of interagency, enterprise GIS-related efforts.

If the Nebraska GIS Steering Committee is to take a leading role in addressing enterprise needs like a state geospatial data center or a statewide land information system, its structure and tools need to be revised to better equip it for addressing these enterprise needs. If these new collaborative mechanisms are to be put in place to serve the geospatial data user community, it will require the support of policy makers and a sustained commitment by a range of state, local, federal, and higher education institutions to pursue creative combinations of new and existing funding avenues and initiatives. To assist policy makers in making these needed changes, the GIS Steering Committee should undertake a review of its structures and capabilities and make recommendations for revisions.

Section 86
GEOGRAPHIC INFORMATION SYSTEM

Section.

86-569. Legislature; Intergovernmental Data Communications Advisory Council; findings. The Legislature finds that the Geographic Information System is a computer-based technology that captures, stores, analyzes, and displays information about the earth's surface from a geographically referenced system, that an interest in the system is rapidly increasing at all levels of government, and that an institutional mechanism is needed to encourage initiatives, coordinate efforts, avoid duplication, seek efficiencies, develop guidelines, policies, and standards for operations and management, promote education and training, and make recommendations so that such technology will benefit the entire state and endure as an analysis tool for decision makers.

The Intergovernmental Data Communications Advisory Council has found that there are many levels of experience, expertise, and hardware and software sophistication among the various levels of government and that guidelines, policies, coordination, and standards are required to realize the maximum benefits of this technology, avoid data quality problems, and resolve conflicts at a reasonable cost for the state.

It is the intent of the Legislature that a Geographic Information System Steering Committee be created with statewide responsibilities to take an active role in implementing the Geographic Information System. Such committee would help facilitate acquisition of such technology at all levels of government and make recommendations to the Legislature for program initiatives and funding and the fostering of communications, training, and education.

86-570. Geographic Information System Steering Committee; created; members; appointment; terms; expenses. The Geographic Information System Steering Committee is hereby created and shall consist of eighteen members as follows:

(1) The director or designee of the Department of Administrative Services, the Department of Environmental Control, The Conservation and Survey Division of the University of Nebraska, the Nebraska Natural Resources Commission, and the Governor's Policy Research Office;

(2) The Director-State Engineer or designee;

(3) The State Surveyor or designee;

(4) The Clerk of the Legislature or designee;

(5) The secretary of the Game and Parks Commission or designee;

(6) The Property Tax Administrator or designee;

(7) One representative of federal agencies appointed by the Governor;

(8) One representative of the natural resources districts nominated by the Nebraska Association of Resources Districts and appointed by the Governor;

(9) One representative of the public power districts appointed by the Governor;

(10) Two representatives of the counties nominated by the Nebraska Association of County Officials and appointed by the Governor;

(11) One representative of the municipalities nominated by the League of Nebraska Municipalities and appointed by the Governor; and

(12) Two members at large appointed by the Governor.

The appointed members shall serve for terms of four years, except that of the initial members appointed by the Governor, one of the representatives of the counties shall be appointed for one year and the other shall be appointed for three years, one of the members at large shall be appointed for one year and the other for three years, and the representative of the public power districts shall be appointed for two years. Their successors shall be appointed for four-year terms. Any vacancy on the committee shall be filled in the same manner as the original appointment, and the person selected to fill such vacancy shall have the same qualifications as the member whose vacancy is being filled.

The members shall be reimbursed for their actual and necessary expenses as provided in sections 81-1174 to 81-1177.

86-571. Committee; officers; advisory committees; meetings. The Geographic Information System Steering Committee shall elect a chairperson from its membership and such other officers as the committee deems necessary. As the need arises, advisory committees may be established by the committee from various levels of government, industry, or the general public to assist the committee.

The committee shall meet quarterly or upon the call of the chairperson.

861-572. Committee; duties. The Geographic Information System Steering Committee shall:

(1) Make recommendations to the Legislature for program initiatives and funding;

(2) Establish guidelines and policies for statewide Geographic Information System operations and management to include:

(a) The acquisition, development, maintenance, quality assurance such as quality control standards, access, ownership, cost recovery, and priorities of data bases;

(b) The compatibility, acquisition, and communications of hardware and software;

(c) The assessment of needs, identification of scope, setting of standards, and determination of an appropriate enforcement mechanism;

(d) The fostering of training programs and promoting education and information about the Geographic Information System; and

(e) The promoting of the Geographic Information System development in the State of Nebraska and providing or coordinating additional support to address Geographic Information System issues as such issues arise;

(3) Report to, assist, and advise the Chief Information Officer in setting information technology policy; and

(4) Provide assistance as requested by the Nebraska Information Technology Commission to support the technical panel created in section 11 of this act.

86-573. Committee; report. Annually, the chairperson of the Geographic Information System Steering Committee shall submit a written report, approved by the committee, to the Governor and the Clerk of the Legislature and shall send a copy of such report to the Intergovernmental Data Communications Advisory Council.

NEBRASKA GIS STEERING COMMITTEE

as of December 2004

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